A Database Publication

THE MICRO USER

Volume 3
Number 12
February 1986
£1.25

Learn how to cheat at Elite

Another pull-out guide inside

Top-selling guide to the BBC Micro!

Acorn unveils
The Master

First full details of dramatic expansion in BBC Micro family

SERIOUS SOFTWARE
FOR THE BBC MICRO

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- As approved by Computer Concepts

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This pack automates the creation of an icon-driven user interface.

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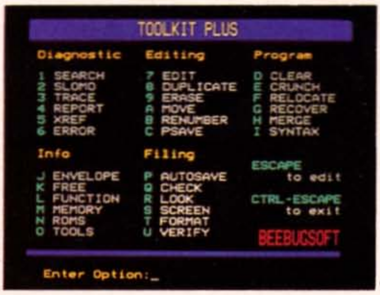
- Unique syntax checker
- "★command" or menu driven
- Toolkit upgrades available

In the two years since its launch Beebugsoft's Toolkit has been chosen by many thousands of BBC users and established a reputation second to none. The launch of our new second-generation Toolkit is therefore something rather special.



```
                    TOOLKIT PLUS
Diagnostic      Editing          Program

1 SEARCH        7 EDIT           D CLEAR
2 SLOMO         8 DUPLICATE      E CRUNCH
3 TRACE         9 ERASE          F RELOCATE
4 REPORT        A MOVE           G RECOVER
5 XREF          B RENUMBER       H MERGE
6 ERROR         C PSAVE          I SYNTAX

Info            Filing
                                 ESCAPE
J ENVELOPE      P AUTOSAVE          to edit
K FREE          Q CHECK
L FUNCTION      R LOOK           CTRL-ESCAPE
M MEMORY        S SCREEN            to exit
N ROMS          T FORMAT
O TOOLS         U VERIFY         BEEBUGSOFT

 Enter Option:_
```

Toolkit Plus is a 16K Rom which has been written from scratch making use of the latest programming techniques. It offers over 40 commands (grouped for ease of use) and some new and very exciting features, all of which may be called directly or from a menu.

TWO SPECIAL FEATURES

1 **Syntax Checker.** The first of its kind on the BBC. As you key in your program, Toolkit will draw your attention to syntax errors that may otherwise come to light only after many program runs. You may also pass complete programs through the checker.

2 **Basic Editor.** A fully integrated full screen editor, comparable with Acorn's stand-alone Basic Editor, using 'single key' commands for Move, Delete, Search etc all from within the on-screen editor.

OTHER COMMANDS

Autosave	Save programs at the press of a key
Psave	Partsave any program section
Xref	Powerful cross referencer to display values of variables, arrays, fns, procs, etc and their line numbers
Format	Flexible disc formatter
Slomo	Program speed controller
Roms	Display & enable/disable Roms
Crunch	Amazing Basic program packer. Beats the rest. (Removed 4,500 bytes from original Masterfile II)
Search	Flexible search & replace with 4 wildcards & special options (eg ignore spaces, Rems, case etc). Integrated with editor
Trace	Output to window with single step options
Error	Auto error detection
Check	Compare memory with disc/tape
Function	Function key editor
Envelope	Envelope display
Clear	Clear all variables
Free	Memory status info.
Duplicate	Copy program lines
Erase	Delete program lines
Move	Move program lines
Look	List file directly from disc/tape
Renumber	Flexible renumber
Memory	Hex and Ascii memory display
Merge	Combine 2 programs
Relocate	Move program in memory
Recover	Recover 'Bad Program'
Report	Extended error reporting
Screen	Screen save
Verify	Disc verify
Tools	Command summary
Menu	Toolkit menu

UPGRADE
Existing Toolkit owners may return their Rom and manual (mail order only) for a discount of **£13.50**

PRICE £39.00 inc. VAT. Available from your local dealer.

For further information: Tel St. Albans (0727) 40303

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Tel: 061-456 8835 (Editorial)
061-456 8383 (Administration)
061-456 8500 (Advertising)
061-480 0171 (Subscriptions)

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January-June 1985

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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Contains exclusive CHEAT program!

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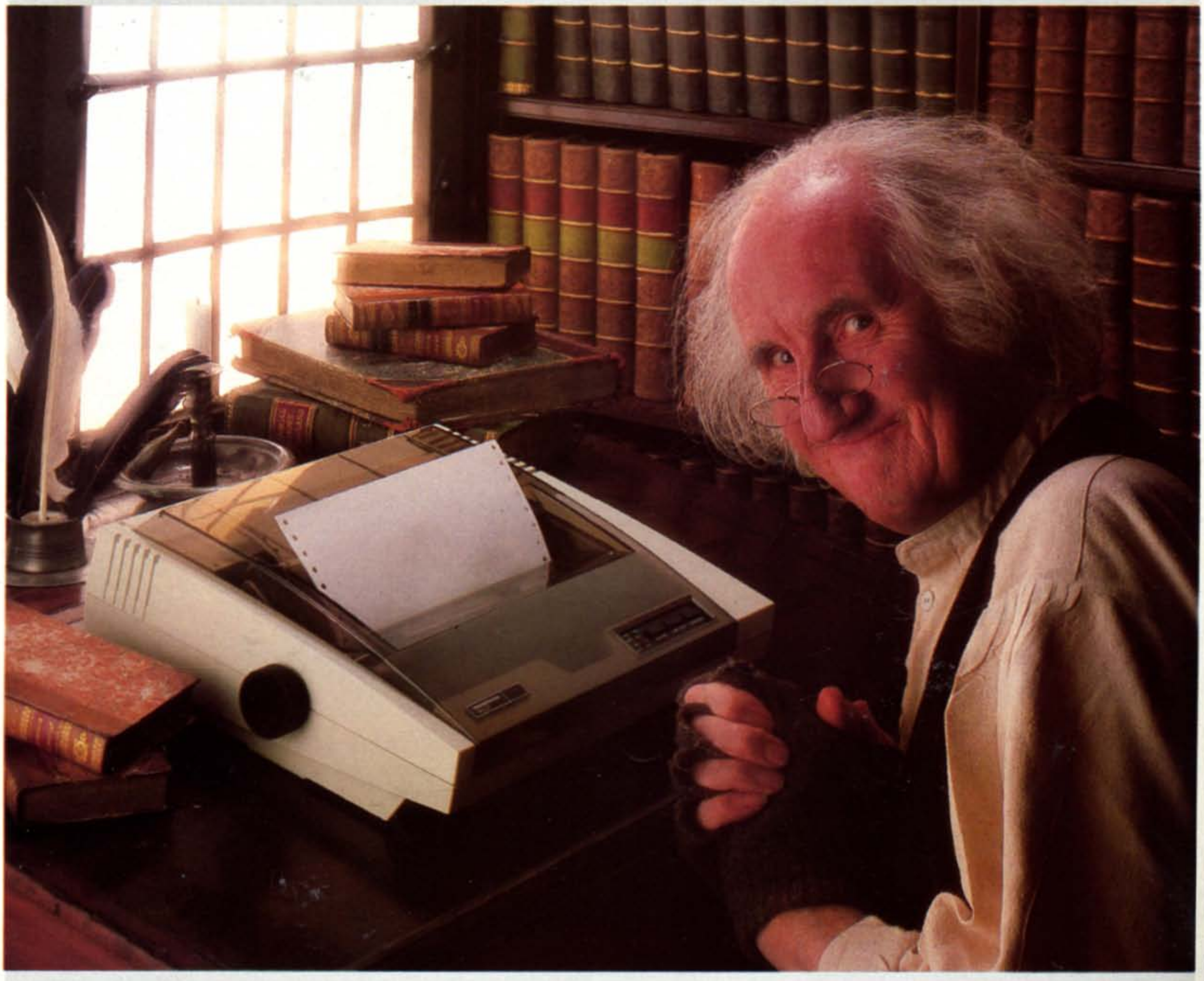
Thrifty micro owners choose the new MT80+



Keen on saving money? But not prepared to sacrifice quality and performance? Then the new MT80+ serial matrix printer has plenty to offer at a price that will have you rubbing your hands with glee.

The MT80+ prints at 100 cps and is compatible with just about any popular office or home micro. For true print flexibility, there's compressed and expanded print, subscripts and superscripts, bold print, italics and, of course, graphics.

You'll have to see the print quality to believe it, thanks to the outstanding film ribbon cassette. Continuous fanfold stationery or friction fed single sheets pose no problem. And if you're in a hurry the quick tear facility is a real bonus.

The new MT80+ from Mannesmann Tally. Europe's leading matrix printer manufacturer. You'll be laughing all the way to the bank. Contact us now for our literature pack.

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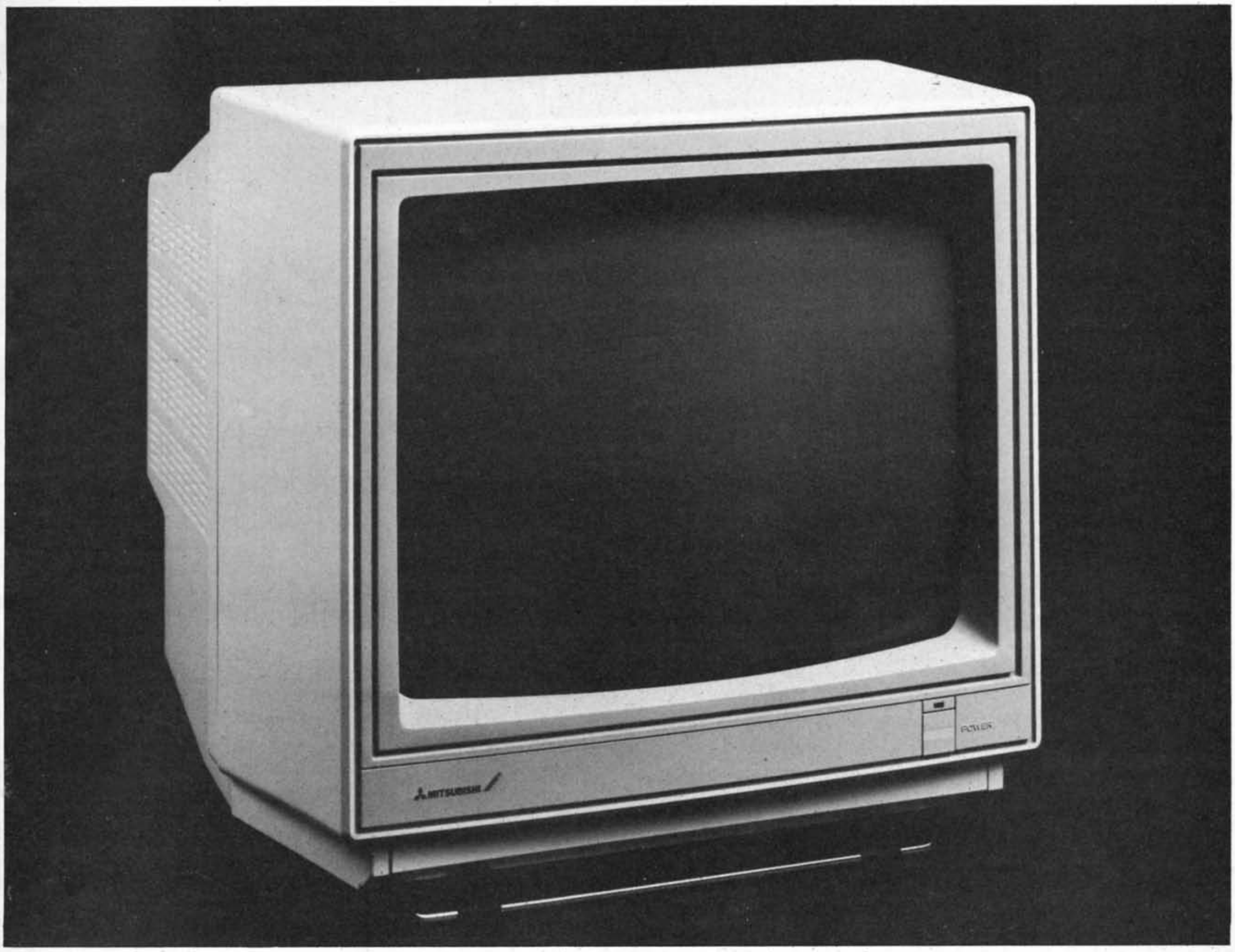

If you're looking for a high resolution colour monitor for your BBC micro, this special Mitsubishi offering from Opus Supplies could be just the contrast you've been waiting for. It's been designed to provide the crispest display no matter how variable the light or shade available. Unlike most high resolution colour monitors the Mitsubishi features both brightness and contrast controls which together with its anti-glare screen ensure a perfect, pin-sharp picture for both character and graphic displays in even the most demanding conditions.

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SOLIDISK FOUR MEG BOARDS MAKE THE BBC MICRO ONE OF THE FASTEST MACHINES YOU CAN BUY

Fit your BBC micro with a Solidisk Four Meg board, and run the PCW BASIC benchmarks in 7.13 seconds, and the PCW Spreadsheet benchmark (with Inter-Sheet) at 312 cells/second.

If you are serious about your business throughput or your "Elite" status, check the effect of Solidisk Four Meg boards. They use a totally new concept for expanding your BBC micro, both in RAM/ROM capacity and in speed.

The newer ROMs have more capacity, 32k as used in the BBC Plus and 64k as in the Communicator. They are also faster and consume far less power than the older 16k and 8k ROMs.

There are four high-capacity Sideways ROM sockets on a Solidisk Four Meg board. You can use a 64k chip in one of them and 32k chips in the other three. Together with the four ROM sockets on the BBC motherboard, you can then fit up to 224k of Sideways ROM into your BBC computer.

Sideways RAM and Shadow RAM haven't been forgotten. The Solidisk Four Meg board can have them too. You can choose either zero or 32k of RAM. The latter can be used either as Shadow RAM or as two banks of Sideways RAM.

Thus, the Solidisk Four Meg boards offer more capacity and yet occupy less space than other boards offering only Sideways ROM/RAM expansion.

In addition, the new Solidisk 256k board offers the Four Meg feature, together with up to eight banks of Shadow RAM and eight banks of Sideways RAM.

But the real plus feature is speed. The Solidisk Four Meg boards make the BBC micro outstandingly fast.

They have a switchable 2 or 4 MegaHertz superfast CMOS 6502 processor. At 4 MHz, the machine can produce up to twice the throughput of a standard BBC B, BBC Plus 64k or BBC Plus 128k. Witness the PCW BASIC and Spreadsheet benchmarks.

Compared with a standard IBM-PC (17.6 sec) and a standard BBC micro (14.6 sec), a Solidisk Four Meg board enables the BBC to run the BASIC benchmark in just 7.13 seconds, putting it amongst the fastest micros that you can buy today.

It is comfortably ahead of a BBC with the Acorn 6502 Second Processor (9.58 sec), and only marginally slower than an IBM-PC AT (TM) (7.11 sec) and a BBC with the Acorn 32016 Cambridge Co-Processor (6.88 sec).

Using Computer Concepts Intersheet to run the Spreadsheet benchmark for speed of recalculation, the Solidisk Four Meg boards enable the BBC to achieve the highest published score amongst microcomputers: it can recalculate more than 24 rows × 13 columns per second (312 cells/sec) by comparison with LOTUS 1-2-3 (89 cells/sec.) or even SYMPHONY (TM) on the IBM-PC (97 cells/sec).

Besides serious applications, the Solidisk Four Meg boards are simply great for computer games. You should just see the stunning graphics and response at 4MHz to realise how good your BBC Micro is. If you don't believe us,

Just try Acornsoft's Elite or Revs with it!

IBM-PC AT is registered trademark of IBM Corp.
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SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL SOUTHEND-ON-SEA (0702) 354674.

The

The basic Four Meg board costs £30.00 inclusive of VAT.

The 32k version comes with software in ROM and on 5 diskettes, and costs £69.00 inclusive of VAT.

The Solidisk Four Meg boards are intended for the BBC Model B only and can be used with existing Solidisk Sideways RAM boards. However, they are not compatible with any other Sideways RAM/ROM boards, or Shadow RAM boards — which they can replace.

The Solidisk Four Meg boards are securely mounted on the original processor socket, and the additional connections may be made either by sprung clips or by soldering.

The sideways ROMs and RAMs built onto the BBC motherboard are not switchable to 4 MHz.

Solidisk 256K Board

Largest and fastest in the range of memory upgrades for the BBC computer is the Solidisk 256k board. This has 256k of RAM, four high-capacity ROM sockets and a superfast 4 MHz 6502 processor. Both the 256k of RAM and the four ROM sockets can run either at 2, or at 4 MHz — twice the speed of the standard BBC B or the B Plus.

It comes with Wordwise Plus, the best-selling wordprocessor from Computer Concepts, and the Solidisk 32k Manager ROM. This latter can allocate the RAM between Shadow RAM, which acts like that on the BBC Plus, Sideways RAM, for holding images of ROM software, and a RAM disc, which can be of up to 200k.

The Hardware

The 256k RAM is divided into eight banks of 32k bytes, which can each be used as Sideways RAM or as Shadow RAM.

Shadow RAM is usually 20k, but may be increased to 30k, to enlarge the RAM available to the user — eg to hold a bigger document or worksheet.

Sideways RAM is usually 16k, but can be 31k to increase the amount of code held in a single bank. Software which occupies two ROM slots in a standard machine may now be re-written into a single ROM slot, thus becoming shorter in size and faster in operation.

If need be, each bank can be shared between the two, i.e. the bottom as Shadow and the top as Sideways RAM, the border line being controlled by the application software.

The four high-capacity ROM sockets on the 256k board can accept chips of any size from 8 to 64k. 32k chips can be configured either as 31k of continuous code or two independent levels of 16k; "resident" and "backup" (this latter being compatible with the BBC Plus). 64k chips can be divided similarly; one resident — again of either 16 or 31k — and the rest as backups.

The processor is switchable between 2 and 4 MHz. At 4 MHz, the machine can produce up to twice the throughput of a standard BBC B, or B Plus, 64 or 128k.

The Manager ROM

This enables the 256k RAM board to be used for VDU screen record/playback, printer/sound buffer, Basic variable storage, or as a RAM disk.

The Manager ROM also contains a toolkit of programming utilities to list variables, edit, find and exchange strings, check, move, salvage, expand, join and renumber programs, load, save and set function keys, report program status, turn cursor and sound on/off, set sound volume etc.

Shadow RAM may be selected by *SHADOW, followed by a mode change, or by FX114, 128 to FX114, 255, exactly as on the BBC B Plus. However on the latter, arguments 128 to 255 all select the same, single Shadow RAM bank, while on the Solidisk 256k board, they can select between up to 128 Shadow RAM banks (if they exist).

As with the earlier Solidisk SWR32, 64 and 128, a group of Sideways RAM banks can be used as a RAM DISC — now of up to 200k. RAM disc is set up by *RAMDISK <drive>. This stimulates a disc drive, now under not only the Solidisk 2.0 DFS but also — for the first time — ADFS. This operates faster than even the Solidisk Winchester.

The Manager ROM makes the 256k board even more versatile. RCAT displays both "resident" and "backup" firmware. Resident firmware includes all ROMs installed in the BBC motherboard, plus all Sideways RAM banks containing ROM images. The command SELECT causes code to be copied from a backup to a Sideways RAM bank, thus making it "resident".

These features provide potential for further developments in software for the BBC Micro — including integrated suites of business applications, such as Computer Concepts' "Inter-" family.

With the most useful RAM capacity, and the doubled speed, the Solidisk 256k board is perfect for the present, while having huge potential for the future.

Prices, inclusive of VAT

The 256k board comes with the Wordwise Plus ROM and manuals, and Solidisk Manager ROM and manual.

Outright	£175.00
Upgrade from SWR 32	£123.00
Upgrade from SWR 64	£89.00
Upgrade from SWR128	£75.00

The 256k boards are securely mounted on the original processor socket, and the additional connections may be made either by sprung clips or by soldering.

THE SOLIDISK - DISC SOLUTIONS

Solidisk can offer you the widest possible choice in hardware and in software. Our 1770 and 1770+8271 disc interfaces are of the finest design, and supported by excellent software. Solidisk DFS and ADFS are highly acclaimed by BBC experts. Our 80-track double-sided floppy disc and high-capacity Winchester drives are the fastest and have the lowest power consumption. The quality of support and the competence of our 90+Local Experts and technicians are unquestionable. So when you shop around, insist on the Solidisk label.

The Solidisk 1770 Disk Interface

The Solidisk 1770 Double Density Disk Interface enables the standard BBC B computer to use floppy disc drives. It has only four components, which are easily fitted by novice and expert alike.

The Solidisk 1770 Double-Density Disc Upgrade (Issue 2) is now fully compatible with the Acorn 1770 DNFS and the Acorn ADFS ROMs.

The Solidisk 1770+8271 Disc Interface

In order to enjoy double density operation, as well as retaining maximum software compatibility with older disc software (which only runs with the 8271), you can now fit the Solidisk 1770+8271 Disc Interface. You can select either the 8271 or the 1770 at a flick of a switch.

It is intended for the BBC Model B already fitted with an 8271 Disc Upgrade, and plugs into the 8271 socket, with the 8271 being transferred to the new board. The Solidisk 1770+8271 Disc Interface (Issue 2) is now fully compatible with the Acorn 1770 DNFS and the Acorn ADFS ROMs.

The Solidisk 2.0 Disc Filing System ROM

This ROM can be used with either 8271 or 1770 Disc Interfaces (Acorn or Solidisk). It has every facility that you would expect, such as disc formatter and verifier, automatic 40/80 track switching, single/double density sensing and programmable track stepping (to suit almost any type of disc drive).

Additional features and utilities include unlimited file catalogue, Read-After-Write (for higher reliability), text editor, memory editor, disc sector editor, whole disc copier, tape-to-disc, download, read and write a track and recover and restore sectors (for recovering corrupted discs).

Even when working with the 1770, it can run all Acornsoft games (such as Aviator, Elite, Revs, Magic Mushroom etc), and most other protected disks (such as Castle Quest, Island's Music System etc.).

It also has several advantages over the Acorn 1770 DNFS ROM including:

1) The option of double-density operation, which gives 60% more storage capacity, i.e. 640k on a double-sided 80-track diskette, as opposed to only 400k.

2) A better emulation of the older 8271 floppy disk controller: some protected disks (such as the early versions of Acornsoft's Elite game will not run with the Acorn 1770 DFS.

These features make the Solidisk 2.0 ROM the most versatile DFS software you can buy.

The Solidisk Advanced Disc Filing System ROM

This ROM-set can be used on the BBC Plus and the BBC Model B fitted with a 1770 Disc Interface (Acorn or Solidisk). It is available as an upgrade for your existing DFS ROM in one 32k or two 16k ROMs.

The Solidisk ADFS was reviewed in A & B Computing, October 1985. Whilst comparable to the Acorn ADFS, it is designed for maximum DFS software compatibility (PAGE=& 1900 with one file open).

The Solidisk ADFS will run most software available for the BBC computer, including all Acornsoft languages and the View family and Computer Concepts Wordwise and the Inter-family.

Additional commands include OPEN <number of files> to reset PAGE appropriately, while MVDFS and MVADFS provide direct transfer of files between DFS and ADFS discs.

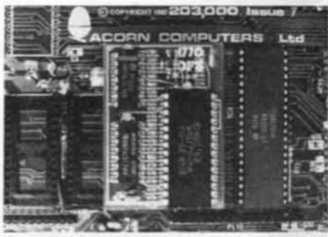
The Solidisk ADFS is equally convenient for use with floppy and hard discs.

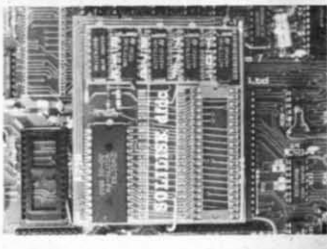
Utilities such as FORM40, FORM80 (for single-sided drives), FORM160 (for double-sided, 80-track drives), VERIFY are provided for floppy discs, whilst BYE used on a hard disc makes a copy of the root directory, to assist recovery in the event of corruption.

The Advanced Disk Filing System (ADFS) is now officially launched by Acorn, and is already revolutionizing software for the BBC Micro. The Solidisk enhancements make it obviously preferable.

Prices, inclusive of VAT

2.0 DFS ROM and manual	£10.00
ADFS+DFS ROM set and manual	£20.00
Upgrade from 2.0 DFS to ADFS	£10.00
1770 Disc Interface, 2.0 DFS ROM and manual	£45.00
1770 Disc Interface, ADFS, DFS ROMs and manual	£55.00
1770+8271 Disc Interface, 2.0 DFS ROM and manual	£50.00
1770+8271 Disc Interface, ADFS, DFS ROMs and manual	£60.00





Solidisk Disc Drives

Solidisk 5.25 inch disc drives are of the latest half-height design, with 80 tracks and double-sided, giving a capacity of 1 Megabyte (unformatted). Features such as automatic spin-up, steel band positioning and a new head mounting system ensure correct centering, consistent tracking performance and long service life of the disc.

The use of a direct-drive motor and the latest VLSI circuitry results in exceptionally low operating noise and power consumption. Therefore two such drives can be powered reliably by the BBC micro.

They are enclosed in strong steel casings, coloured in elegant beige, to protect the high-precision mechanism. The power and data leads are fitted with appropriate connectors, to suit the BBC computer.

With each disk drive purchase, Solidisk provide five volumes of useful software, each on a separate diskette, and a User Manual.

Volume 1

Solidisk Word Processor and Spelling Checker, with English dictionary. You enter by *WP <filename>, and then start typing. Wordstar-like commands make it easier to use than Wordwise, View or Scribe. What you see on the screen is what will be printed. The most useful commands are displayed at the top of the 80 column screen. It provides on-screen justification, automatic margin, insert/overwrite, search and replace, word count, word frequency count, free space, *commands and page numbering. Block operations include move, delete, copy, print, load to cursor. The Solidisk Word Processor has the unusual ability to spellcheck your document without leaving it, simply by typing Control-U.

Volume 2

This contains the Solidisk Database. It uses an 80-column display, is completely menu-driven, can be easily customised and allows datafiles as large as the filing system permits.

You enter the database with Shift-Break, and select one of the 15 options, each leading to a sub-menu. Datafiles can have an unlimited number of records, each with up to 15 fields of up to 60 characters. You can search, sort, view, print using tabulation, print labels, print forms, edit and delete, calculate on fields, merge databases, mailmerge etc.

Volume 3

This contains the Solidisk spreadsheet. Also using 80-column display and menu-driven, it has options to create, edit, recalculate, and print etc. Spreadsheets can have unlimited numbers of rows and columns. Each column can be from 2 to 70 characters wide. All the BBC Basic maths functions are available.

Volume 4

This contains the Solidisk MACRO language. It is Control, TAPE to DISC. DZAP, MZAP and SILEXIGEN, a dictionary generator for the Solidisk Spelling Checker together with a sample French dictionary.

Volume 5

This contains the Solidisk MACRO langauge. It is capable of generating a Basic program using PROCEDUREs, FUNCTIONs, MACROs and machine code routines contained in other programs.

Using the Solidisk MACRO language, you can extract useful parts of existing programs to set up your own MACRO libraries, then use them later on as building blocks for new programs.

The Solidisk computer case

This compact steel case is coloured in beige and especially designed to hold the BBC micro and two Solidisk disc drives. It will support even a heavy-weight monitor, while providing good cooling for the power supply and concealing many connecting cables.

The keyboard is housed in a separate case, connected by a 24 inch flexible data cable. It is ½ inch lower than the original case, does not skid about on the desk and makes a lot of difference to typists (even two-fingered ones!).

Prices, inclusive of VAT

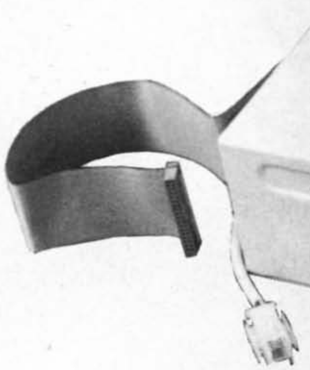
Solidisk 80-track, double-sided disc drive unit with software and manual	£109.00
Dual 80-track, double-sided disc drive unit with computer and separate keyboard cases, software and manual	£230.00
Computer and keyboard case alone	£ 30.00

We reserve the right to change prices and specifications without prior notice.

A COMPLETE SOLUTION TO BUSINESS COMPUTING

Suitably equipped, your BBC Micro is an excellent computer for the office. It can run wordprocessor, database, spreadsheet etc better than many other business machines. It can also communicate with other micros and mainframe computers, either directly or via a MODEM.

Solidisk has selected the best in business software, disc drives and printers to form the Solidisk Office System, based upon the BBC Model B or the B Plus. With the Model B, a Four Meg board or a 256k expansion may be fitted along with a 1770 or a 1770+8271 disc interface. Both models can have a Winchester hard disc connected.



The Solidisk Wordprocessor, Disc Drive and Printer Package

The Wordprocessor is the famous WORDWISE PLUS — the best selling wordprocessor from Computer Concepts. Various reviewers speak of WORDWISE PLUS as very user friendly, flexible, straightforward or simply excellent (1). With it, you can write letters and longer documents, and change them to your satisfaction before printing. If you need many similar letters or standard forms, you need only write them once. Wordwise Plus can search and replace any word or phrase, and also mailmerge.

The 5.25 inch disc drive is of the latest half-height design, with 80-track double-sided, giving a net capacity of 640k bytes per disk (in double density). The diskettes are industry standard, readily available and low in cost. The power and data leads are fitted with appropriate connectors, to suit the BBC computer.

The printer is a 9-needle dot-matrix, with a speed of 160 characters per second in normal mode and 32 characters per second in Near Letter Quality mode. Features include multiple pitch settings, italics, boldface, underline, super and subscript, bit image graphics etc. It uses the same ribbon and control codes as the Epson FX85(2).

All manuals and accessories like printer ribbon, printer cable and paper, and a blank diskette are included, so that you can start right away. The package also contains a list of other selected software and hardware available from Solidisk.

Other possible applications

The Solidisk Office System can do more than just wordprocessing. To complement WORDWISE Plus, five volumes of useful software are provided, each on a separate diskette, including Spelling Checker, Database and Spreadsheet programs. You can use the database for mailing lists, customer records, stock inventories etc and the spreadsheet for cheque book balancing, budgeting and forecasting. The database is powerful enough to do important work such as processing all the Solidisk customer records (over 50,000).

However, you need not be limited to the bundled software, but can easily increase the power of the system with, eg a spreadsheet such as Inter-Sheet, a business graphics such as Inter-Chart, or a database such as Viewstore, for more demanding applications. With this last you can, for example, set up a datafile of 30,000 membership records of a video club and have any or even all fields indexed. You can then display them in sorted order, retrieve any record instantly with a few keystrokes, and have a report printed on most popular titles, age groups, takings etc. Such a large database requires a disc drive of very high capacity which in practice is a Winchester disc. Even if your present needs are not as large as this, it is nice to know that this system can grow tith you.

Prices

The Wordprocessor, disc drive and printer package is available for the BBC model B Plus or the Model B fitted with disk interface. This includes:

- WORDWISE PLUS ROM, keystrip and manuals.
- one double-sided 80-track disc drive.
- one 160 cps printer.
- five software diskettes and manuals.
- all leads, blank diskette and 100 sheets of fanfold paper.
- one year guarantee.

The complete package costs £269.00 plus VAT.

Owners of BBC Model B's can purchase a Solidisk 1770 disc interface and a 2.0 DFS ROM, together with teh above package, at a special price of only £299.00 plus VAT (saving £10.00).

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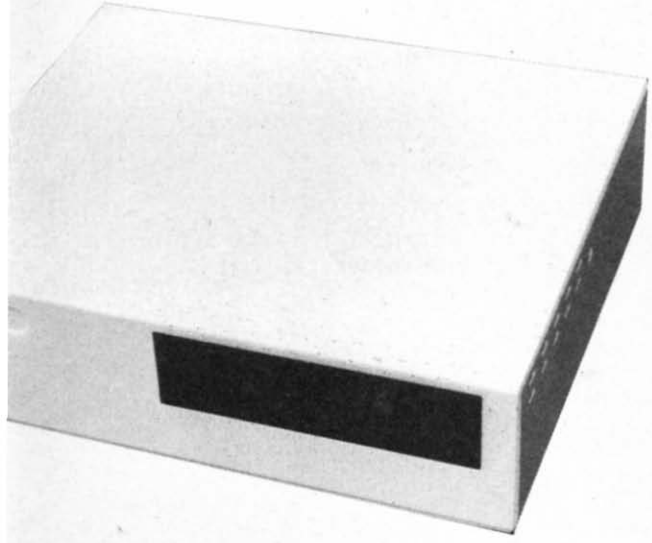
(1) See reviews in E & CM, CEEFAX, Acorn User.

(2) Solidisk own direct imports from Japan, subject to change without notice for improvements.



THE SOLIDISK WINCHESTER DISC DRIVE

The drive has a capacity of 20 Megabytes formatted. Both single- and dual-drive models are available.

Two key advantages of Winchesters over floppy discs are higher capacity and faster transfer rate.

Unlike floppy disc drives, Winchester drives are enclosed in sealed casings, allowing very high track density, up to 600 compared with 40 or 80.

Their discs are non-removeable, rotating continuously at high speed (3600 rpm), enabling data to be transferred 20 times faster than single-density floppy discs.

The Solidisk Winchester drive has a further advantage over some competitors. It has "buffered seek", hence stepping pulses can be as short as 2 microseconds. This results in an average access time of 80 milliseconds — less than one-hundredth of some other drives. This is especially important as the Winchester fills up, for example when used with a large database.

Hardware requirements

To use a Solidisk Winchester, you will need either a BBC Plus or a BBC model B, fitted with a 1770 Disc Interface (Acorn or Solidisk). The Winchester drive is connected to the 1MHz bus socket.

Software compatibility

The Solidisk Winchester drive is normally used under the Solidisk ADFS, which allows file sizes up to 512 Megabytes and provides a hierarchical directory, permitting an essentially unlimited number of files.

The Solidisk ADFS will run most software available for the BBC computer including all Acornsoft languages and the View family, and Computer Concept Wordwise and the Inter-family. In particular, ViewStore is well suited for databases on Solidisk Winchesters.

All the Acorn Second Processors (6502, 32016 and Z80) are largely compatible with Solidisk Winchesters. Applications such as System ADE running on the 6502, PANOS on the 32016, BBC Basic (Z80) and CP/M (with new HD ROM and HD BIOS) on the Z80 are compatible.

However, software that is not compatible with ADFS will not run.

Prices

The Solidisk Winchester packages consist of:

- One or two Winchester drives, enclosed in a steel casing. The drives come already formatted and loaded with the Solidisk "Initial Software" package, containing a collection of useful programs, such as CATALL, EXALL, ARCHIVE etc.
- A utility disc containing the SAFE program which allows recovery of a corrupted disc.
- A Solidisk ADFS+DFS ROM-set.
- A set of manuals.

Three models are available:

1) 20 Megabytes without its own power supply, but uses that of the BBC Micro	**£575.00+VAT**
2) 20 Megabytes with its own power supply	**£650.00+VAT**
3) Dual 20 Megabytes with its own power supply	**£999.00+VAT**

The minimum model is only suitable for use with BBC computers fitted with the current, switched-mode power supply and one Solidisk low power floppy disc drive.

The Linemaster ROM and Modems

The Solidisk Linemaster ROM allows the BBC Micro to communicate with other computers. In addition to the standard Terminal and Prestel modes, it has Viewdata Host Mode and the ability to autodial and autoanswer, all controlled by software.

In Terminal mode, your BBC micro acts as a terminal to other computers, either locally by a serial cable link or remotely, via a modem and telephone line, eg bulletin boards. It supports various BAUD rates and protocols, and has elapsed time clock, 40/80 column screen display etc.

The Prestel mode is designed for accessing the British Telecom Viewdata service. The facilities include tagging, searching and displaying pages, sending and receiving text and downloading software from and to disc.

A special feature of the Solidisk Linemaster ROM allows you to set up your BBC Micro as a Viewdata host. In this mode, other users can communicate with your computer exactly as with Prestel. You can edit pages, make up routing instructions, collect responses etc.

The Solidisk Linemaster Communication ROM works well with all BABT approved MODEMs such as the WS2000, the Nightingale etc but many MODEMs do not support all the features of the Linemaster ROMs. The Telemod 1 for example offers only 1200/75 baud, and is therefore only suitable for communicating with Prestel (or other Viewdata hosts).

Solidisk local experts

Solidisk has a nationwide network of more than 90 local experts and a growing number of experts overseas.

They do not sell our equipment but can generally fit it for you free of charge. If you would like to take advantage of this unparalleled service, ring Solidisk Sales Office.

If you wish to call at our office, please make an appointment.

Tel Southend (0702) 354674
(16 lines)

ORDER BY MAIL: Please complete (or copy) this coupon and send it to:

Solidisk Technology Ltd, 17 Sweyne Avenue, Southend SS2 6JQ

Prices, inclusive of VAT

RAM/ROM expansion

Qty		Price	P&P
....	Basic Four Meg board	£30.00	£1.00
....	Four Meg board with 32k RAM	£69.00	£1.00
....	SWR32 with software pack 1	£53.00	£1.00
....	SWR64 with software pack 1	£80.00	£1.00
....	SWR128 with software pack 1	£125.00	£1.00
....	256k board with WW+ and Manager	£175.00	£1.00
....	'Ashtray' extension	£15.00	£1.00

DISC upgrade

....	1770 upgrade with 2.0 DFS ROM	£45.00	£1.00
....	1770+8271 upgrade, 2.0 DFS ROM	£50.00	£1.00
....	ADFS+DFS ROM set	£20.00	£1.00
....	Upgrade from DFS to ADFS+DFS	£10.00	£1.00
....	Solidisk 80-track double-sided	£109.00	£3.00
....	Dual drives, CPU and keyboard case	£230.00	£6.00
....	CPU and keyboard case alone	£30.00	£6.00
....	EFS for the Electron	£59.00	£1.00

Wordprocessor package

....	Wordprocessor for the B Plus	£309.35	£10.00
....	Wordprocessor with 1770 DFS	£458.85	£10.00

Winchesters

....	20MB without PSU	£661.25	£10.00
....	20MB with PSU	£747.50	£10.00
....	40MB with PSU	£1148.85	£10.00

Modems

....	Linemaster ROM and manual	£10.00	£1.00
....	Telemod 1 (BABT approved) MODEM, with Linemaster ROM	£50.00	£3.00
....	Other MODEMs	POA	

Datalife Diskettes

....	MD525 box of 10	£16.00	£1.00
....	MD557 (2S/4D)	£25.00	£1.00

Eproms

....	2764-25 to clear 20 pcs	£25.00	£1.00
....	27128-25 (or better) pack of 5	£25.00	£1.00
....	27256-25 (or better) pack of 3	£25.00	£1.00
....	UVIPROM Eprom programmer	£19.00	£1.00
....	UVIPROM32 for our 27256's	£21.00	£1.00
....	UVIPAC Eprom eraser	£20.00	£1.00
....	Solidisk Toolkit ROM	£10.00	£1.00
	Total		....

Name: ....

Address: ....

....

....

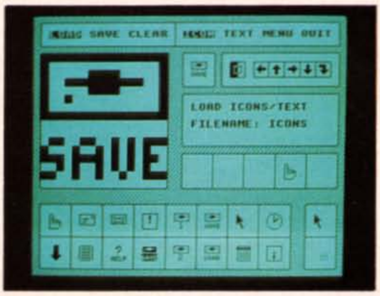
BARCLAY

ACCESS

We reserve the right to change prices and specifications without notice. If you wish to call at our office (Mondays to Fridays 9.30am to 5.30pm), please ring for an appointment.

ICON MASTER — Icon Control System

GIVE YOUR PROGRAMS THAT PROFESSIONAL TOUCH



LOAD ICONS/TEXT
FILENAME: ICONS

This pack automates the creation of an icon-driven user interface. It is supplied on a 16K Rom and allows you to design a screen containing icons and then use it in your own programs, in place of a normal menu.

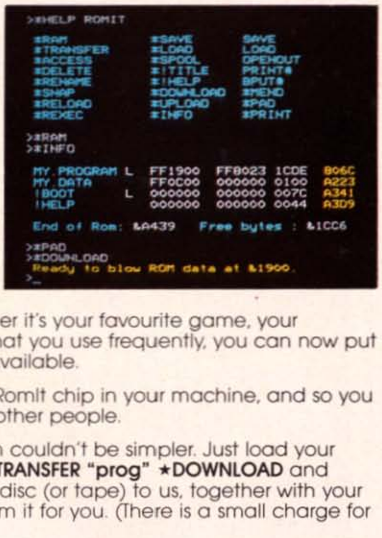
It is easy to use and may optionally be controlled with the AMX mouse. Icons (sample sets provided) are designed on a special Icon screen editor and are compatible with AMX icons.

Having designed the icons, the next step is to select the Menu editor and design your final screen. You may position your icons and text wherever you choose on the screen. Icon Master then generates the code to append to your Basic program which will reproduce your icon screen and handle user input.

Your own icon-driven programs may be used with or without the Icon Master Rom in your machine.

ROMIT — Put your own Basic programs into Rom

CREATE YOUR OWN SILICON DISC



```
>*HELP ROMIT

 *RAM            *SAVE        SAVE
 *TRANSFER       *LOAD        LOAD
 *ACCESS         *SPOOL       OPENOUT
 *DELETE         *!TITLE      PRINT#
 *RENAME         *!HELP       BPUT#
 *SWAP           *DOWNLOAD    *MEND
 *RELOAD         *UPLOAD      *PAD
 *REXEC          *INFO        *PRINT

>*RAM
>*INFO

 MY.PROGRAM L  FF1900  FF8023 1CDE  806C
 MY.DATA       FF0C00  000000 0100  A223
 !BOOT      L  000000  000000 007C  A341
 !HELP         000000  000000 0044  A3D9

 End of Rom: &A439   Free bytes : &1CC6

>*PAD
>*DOWNLOAD
Ready to blow ROM data at &1900.
>_
```

RomIt is a 16K Rom which adds a new feature to your BBC Micro — A Ram Filing System. This provides over 20 new commands which enable you to:

1. Create a silicon disc with its own filing system commands. Type ★RAM, then you can catalogue the 'disc', save and load files to it, storing as many files as memory will allow. You will need sideways Ram to use this facility.

2. Put your own Basic or assembler programs (or any file) into Ram and then make them into Eproms. Whether it's your favourite game, your function key definitions or any program that you use frequently, you can now put it into Eprom so that it's always instantly available.

Your Eproms will work with or without the RomIt chip in your machine, and so you may pass on copies of your programs to other people.

Getting your own Basic program into Rom couldn't be simpler. Just load your program into memory and type: **★RAM ★TRANSFER "prog" ★DOWNLOAD** and either connect it to a blower, or send the disc (or tape) to us, together with your RomIt registration number, and we will Rom it for you. (There is a small charge for this service).

3. Use your sideways Ram as a printer buffer so that you can continue to use your computer for other work at the same time as printing long documents.

Over 20 new ★commands are provided by RomIt

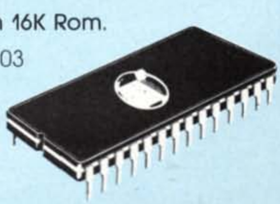
To get the most from RomIt you will need sideways Ram fitted to your computer, eg just a single Ram chip plugged into your ATPL (or other) Rom board.

ICONMASTER £34.00 ROMIT £34.00 inc.VAT

Available from your local dealer. Supplied on 16K Rom.

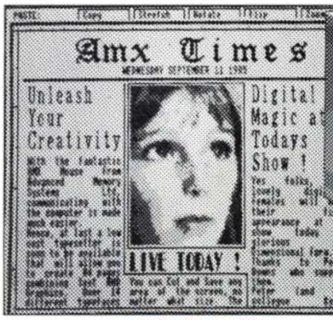
For further information: Tel St.Albans (0727) 40303

24 hour Access & Barclaycard hotline
Tel Penn (049481) 6666



Mail order to
Beebugsoft, P.O.Box 109, St.Johns Road,
High Wycombe, Bucks, HP10 8NP

Now you can stretch your imagination, without stretching your budget.



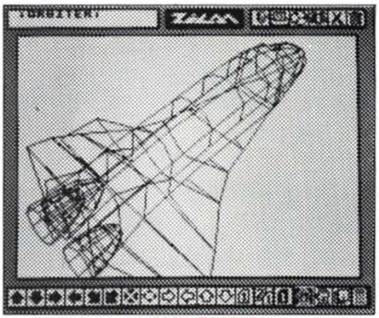
Amx Times

Unleash Your Creativity

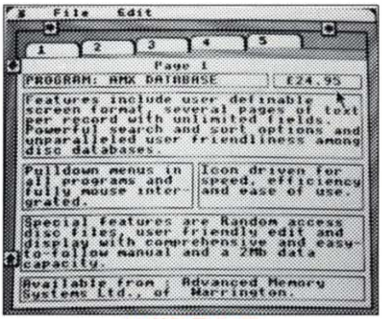
Digital Magic at Todays Show !

LIVE TODAY !

AMX PAGEMAKER
£49.95 INC VAT, 2 ROMS + DISC



AMX 3D ZICON
£24.95 INC VAT, DISC



Page 1

PROGRAM: AMX DATABASE £24.95

Features include user definable screen format, several pages of text per record with unlimited fields. Powerful search and sort options and unparalleled user friendliness among disc databases.

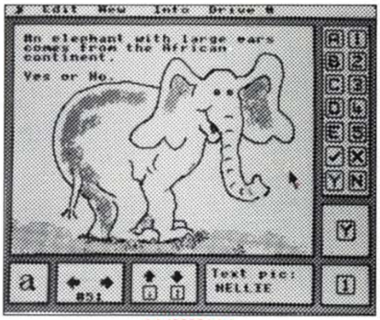
Pulldown menus in all programs and fully mouse intergrated.

Icon driven for speed, efficiency and ease of use.

Special features are Random access disc files, user friendly edit and display with comprehensive and easy-to-follow manual and a 2Mb data capacity.

Available from : Advanced Memory Systems Ltd., of Warrington.

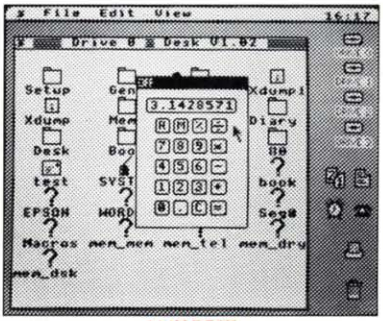
AMX DATABASE
£24.95 INC VAT, DISC



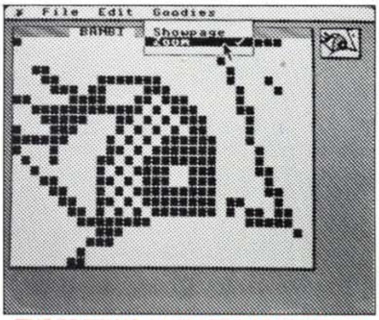
An elephant with large ears comes from the African continent.

Yes or No.

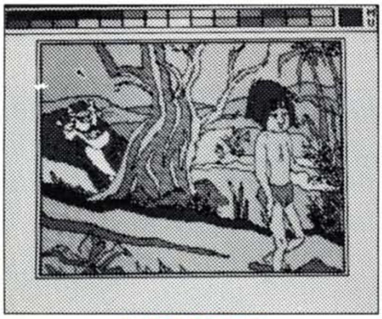
AMX XAM
£24.95 INC VAT, DISC



AMX DESK
£24.95 INC VAT, DISC



THE ORIGINAL AMX ART PLUS UTILITIES
£14.95 INC VAT, DISC



AMX PAINT POT
£14.95 INC VAT, DISC

From Advanced Memory Systems comes an irresistable selection of Icon driven software that AMX Mouse, ROM and AMX Super ROM owners can really get their teeth into!

Seven incredible programs, so comprehensive, they will more than satisfy even the most demanding BBC Micro user and when coupled with the AMX Mouse will broaden the horizons of the BBC Micro to new, undreamed of standards of sophistication.

AMX PAGEMAKER.

A fantastic high resolution A4 Typesetting and Artwork system.

Comprising 2 ROMS (8K and 16K) 'Pagemaker' features a fast scrolling A4 page.

There is a wide selection of typefaces and user definable fonts.

You can load in Wordwise and View files or type directly onto screen.

An incredible 'Cut and Paste' facility includes copying, rotating, stretching and zooming.

For the professional touch there is N L Q high quality dump, and you can dump any part of, or full A4 page.

AMX 3D ZICON.

Now, with a 3D ZICON you can transform three dimensional vector data and translate them into on-screen graphics.

You can Print or Plot graphics to suitable peripherals and produce output suitable for other AMX programs such as ART – UTILITIES and Paintpot.

There is even the facility to sketch in two dimensions and convert to three dimensions and auto swaps generator.

Some interesting example objects on file include – helicopter – jet plane and dodecahedrom.

AMX DATABASE.

Database is a brand new super filing program featuring 1000 records and unlimited fields per record.

It has a powerful search and sort facility and user friendly edit and display.

In fact it is probably the most advanced user friendly database available today.

Special features include: User definable screen format for record display – random access files – super fast sort – flexible printer dump and screen display.

AMX XAM.

A brand new and exciting educational program with maximum flexibility, allowing a multitude of options and variations.

With XAM you can create a multiple choice exam which would not be alterable by the examinee.

And you can incorporate within the questions, your own pictures, created on AMX ART, building the finished picture into the quiz and providing an extra and fascinating aspect to the examination.

AMX DESK.

The complete home or office acquisition.

You will wonder how you ever managed without AMX Desk.

Just point your Mouse and select the following additional aids:

MEMO-PAD for up to three pages of text

TELEPHONE/ADDRESS BOOK with 200 or 400 scrolling entries

DIARY with three months calender

ALARM to remind you about appointments

CALCULATOR – Yes! A full function calculator that cannot be lost or suffer flat batteries, and any window can be dumped to your printer at the touch of a button.

THE ORIGINAL AMX ART PLUS UTILITIES.

Now available as a single package – two of AMX's most popular programs.

AMX ART is a superb mode 4 graphics program, making full use of windows, icons, menus and pointers, it allows you to create your own pictures and the host of graphic features in AMX UTILITIES including a fantastic zoom facility for accurate amendments to your ART pictures – one dot becomes a character.

You can also move, copy, rotate, reflect, enhance circles, draw ellipses and arcs, even print icons.

Border can be added and pictures stripped and centred for saving and printing. All pictures can be loaded into AMX PAGEMAKER, AMX 3D ZICON, AMX XAM, AMX PAINT POT, and AMX SUPER ART.

AMX PAINT POT.

The pictures you have created with AMX ART and enhanced with AMX Utilities can now be coloured in, using PAINT POT.

They will burst into life with rich, vibrant colours, and with a palette of 256 different shades you should not be short of inspiration.

You can even store up to 20 Illustrations in Picture Show mode, then display them in sequence.

To start you off we have included eight exciting pictures in the program.

AMX SOFTWARE

IMAGINATION AT YOUR FINGERTIPS.

ALL THESE EXCITING AMX ROM AND AMX SUPER ROM COMPATIBLE PACKAGES ARE AVAILABLE FROM GOOD COMPUTER DEALERS OR
BY SENDING CHEQUE OR PO TO FREEPOST ADVANCED MEMORY SYSTEMS LTD
FOR INSTANT ACCESS OR VISA ORDERS TELEPHONE (0925) 413501

We thought it was about time we put you in the picture.

When we introduced our AMX Mouse to BBC Micro users, the response was phenomenal.

And no wonder!

It was regarded as 'pushing the BBC to its limits' and hailed by the press as 'probably the best input device that has appeared recently'. The AMX Mouse brought to BBC Micro users the same sophisticated, positive control that had, until then, been the province of the more expensive computers, like the Macintosh.

Now we announce a new enhanced software package which, can be used with a traditional keyboard or joystick but truly comes into its own when used with the AMX Mouse.

AMX Super ROM and Super Art adds colour to the features of the original AMX ROM, on a new 16K ROM.

It dramatically extends the original AMX ROM facilities to include Pull Down Menus, over lapping colour windows, colour patterns and an extended Icon set in all graphic modes.

Specially written to be usable with the vast majority of BBC Systems including 2nd processors, the Aries RAM Board, the BBC + Shadow mode, tape, DFS and ADFS.

The kernel of the Super Art program is included in the 16K ROM, providing tape and disc users with a Mode 1 colour drawing program.

But Super Art really comes into its own when used on a disc based system; a host of additional facilities can be selected direct from the screen.

Colour pictures can be created in dot resolution up to A4 size by scrolling the screen window, over the picture.

Other facilities include colour pattern editing – use of icons, additional text styles, various copy facilities and a superb colour Zoom.

AMX MOUSE
AMX SUPER ART
AMX ART

Pictures can be printed out in colour (Integrex) or shades of black and grey on Epson compatible printers.

The results can be astonishing! – you can even store your finished 'masterpieces'.

The AMX Icon Designer facility gives you further freedom to design and store your own custom icons for use in your own programs.

This fabulous new package costs only £89.95 – a price as remarkable as the package itself – and includes a fully illustrated operating manual.

If, however, you are afraid of mice, you can purchase just the software package plus the 16K Super ROM for just £49.95.

You will still achieve some pretty remarkable results using your keyboard or joystick – not nearly as good as with the Mouse of course – but you can always add one later on for just £40.

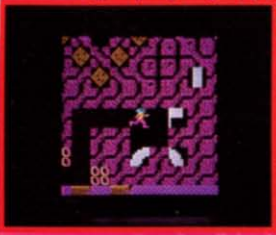
Then you'll really be 'in the picture'.

AMX MOUSE

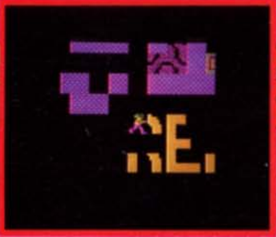
IMAGINATION AT YOUR FINGERTIPS.

BOTH THESE EXCITING PACKAGES ALONG WITH OUR SUPERB RANGE OF AMX ROM AND SUPER ROM COMPATIBLE SOFTWARE ARE AVAILABLE FROM ALL GOOD COMPUTER DEALERS OR BY SENDING CHEQUE OR P.O. TO FREEPOST ADVANCED MEMORY SYSTEMS LTD., 166-170 WILDERSPOOL CAUSEWAY, WARRINGTON, WA4 6QA. FOR INSTANT ACCESS OR VISA ORDERS, RING (0925) 413501

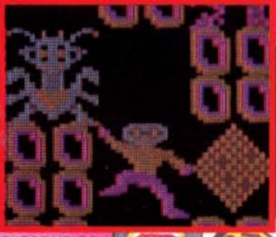
MORE THAN JUST A SEQUEL, A NEW EXPERIENCE



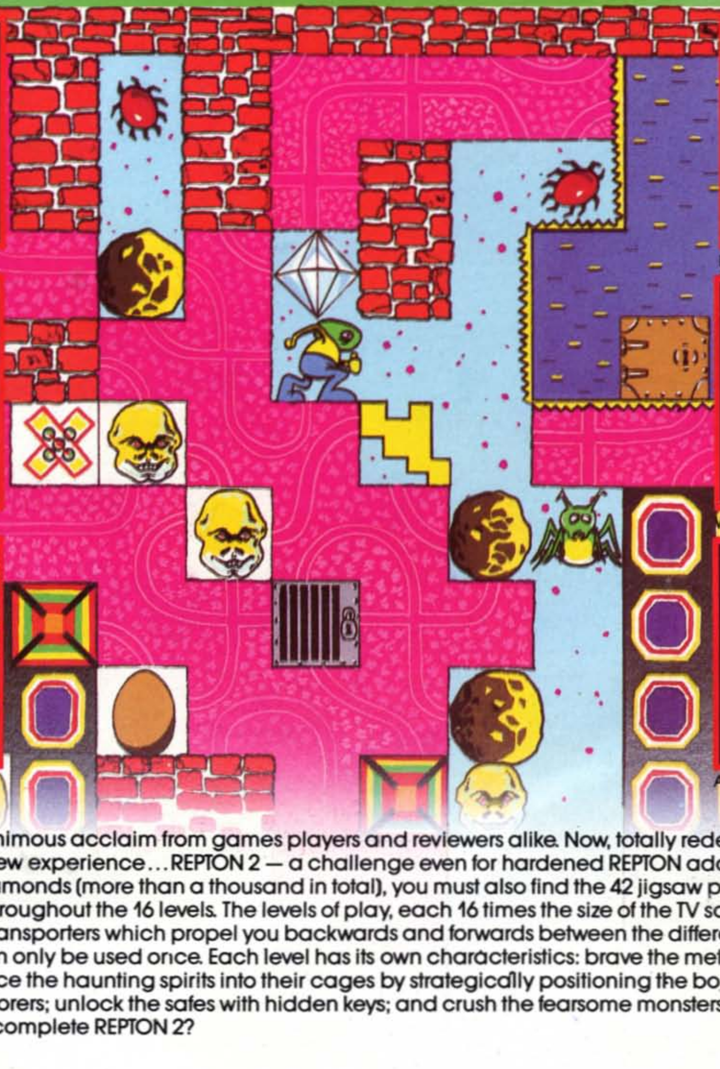
COLLECT THE PUZZLE PIECES

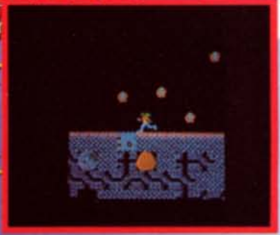


THE PUZZLE PIECES IN POSITION

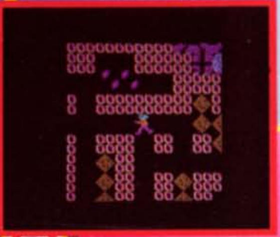


CLOSE-UP OF A MONSTER

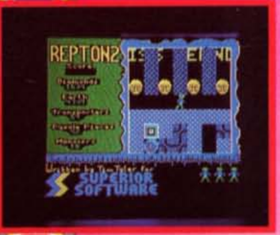




DODGE THE METEOR SHOWERS



WATCH OUT FOR THE BLIND SPIRITS



ACORN ELECTRON VERSION

REPTON 2

REPTON met with unanimous acclaim from games players and reviewers alike. Now, totally redesigned and rewritten, we bring you a new experience... REPTON 2 — a challenge even for hardened REPTON addicts! Not only must you collect all the diamonds (more than a thousand in total), you must also find the 42 jigsaw puzzle pieces which have been strewn throughout the 16 levels. The levels of play, each 16 times the size of the TV screen, are connected by a series of transporters which propel you backwards and forwards between the different scenarios — but each transporter can only be used once. Each level has its own characteristics: brave the meteor storms at the planetary surface; entice the haunting spirits into their cages by strategically positioning the boulders; avoid the eerie skulls of past explorers; unlock the safes with hidden keys; and crush the fearsome monsters which hatch from giant eggs. Can **you** complete REPTON 2?

ACORN ELECTRON

BBC MICRO

MORE PRIZES!

Complete REPTON 2 and enter our competition. The first 100 winning entrants will each receive a beautifully designed "I'VE COMPLETED REPTON 2" cotton T-shirt; all correct entries received before 31st March 1986 will be eligible for the cash prize of **£200**

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MicroLink
Your personal passport to the world of communications with
TELECOM GOLD
Telecom Gold is a trademark of British Telecommunications plc

What it offers the BBC Micro user...

Give your micro mainframe power

With MicroLink your micro becomes a terminal linked directly to the Telecom Gold mainframe computer, and able to tap its tremendous power and versatility. Right away you'll be able to use giant number-crunching programs that can only run on a mainframe. You can set up your own computerised filing systems, store and update statistics and other information, cross-reference material between files, selectively extract the information you want, perform massive calculations and design reports to display information from any of the files and in any format you choose.

The biggest bulletin board of them all

The number of bulletin boards is growing rapidly. New ones are springing up in all parts of Britain and all over the world, with people of like minds chatting to each other on all manner of subjects. The only snag is that the vast majority are single-user boards – which means lots of other people are also trying to make contact and all too often all you get is the engaged tone. But with the MicroLink bulletin board there is no limit to the number of people using it at the same time. And no limit to the number of categories that can be displayed on the board.

We're only a local phone call away

More than 96 per cent of MicoLink subscribers can connect to our mainframe computer in London by making a local phone call. This is possible because they use British Telecom's PSS system, which has access points all over Britain. A local phone call is all you need, too, for access to the international Dialcom system through MicroLink.

Telemessages – at a third of the cost

The modern equivalent of the telegram is the telemessage, which if sent before 8pm is delivered by first post the following day (except Sunday). Originally designed for people to phone their message via the operator, the service costs £3.50 for 50 words. Now it's available via MicroLink – and costs only £1.25 for up to 350 words!

Send and receive telex messages

With MicroLink you can turn your micro into a telex machine, and can send and receive telex messages of any length. You will be able to communicate directly to 96,000 telex subscribers in the UK, 1½ million worldwide – and even with ships at sea via the telex satellite network. Business people can now send and receive telexes after office hours, from home or when travelling. You can key in a telex during the day and instruct MicroLink not to transmit it until after 8pm – and save 10 per cent off the cost!

The mailbox that is always open

MicroLink is in operation 24 hours a day, every day. That means you can access your mailbox whenever you want, and from wherever you are . . . home, office, airport – even a hotel bedroom or golf club! No-one needs to know where you are when you send your message.

What does it all cost?

Considering all the services you have on tap, MicroLink is remarkably inexpensive. You pay a once-only registration fee of £5, and then a standing charge of just £3 a month. On-line costs are 3.5p a minute (between 7pm and 8am) or 10.5p a minute during office hours. There is an additional 2p a minute PSS charge if you are calling from outside the 01- London call area. Charges for telex, tele-messages and storage of files are given on the next page.

How much it costs to use MicroLink

Initial registration fee: £5.

Standing charge: £3 per calendar month or part.

Connect charge: 3.5p per minute or part – cheap rate; 10.5p per minute or part – standard rate.

Applicable for duration of connection to the Service. Minimum charge: 1 minute.
Cheap rate is from 7pm to 8am, Monday to Friday, all day Saturday and Sunday and public holidays; Standard rate is from 8am to 7pm, Monday to Friday, excluding public holidays.

Filing charge: 20p per unit of 2,048 characters per month.

Applicable for storage of information, such a telex, short codes and mail files. The number of units used is an average calculated by reference to a daily sample.

Information Databases: Various charges.

Any charges that may be applicable are shown to you before you obtain access to the database.

MicroLink PSS service: 2p per minute or part (300 baud); 2.5p per minute or part (1200/75 baud).

Only applies to users outside the 01- London call area.

Telex registration: £10.

Outgoing telex: 5.5p per 100 characters (UK); 11p per 100 (Europe); 16.5p per 100 (N. America); £1.15 per 400 (Rest of world); £2.75 per 400 (Ships at sea).

Deferred messages sent on the night service are subject to a 10 per cent discount.

Incoming telex: 50p for each correctly addressed telex delivered to your mailbox. Obtaining a mailbox reference from the sender incurs a further charge of 50p.

It is not possible to deliver a telex without a mailbox reference. If a telex is received without a mailbox reference the sender will be advised of non-delivery and asked to provide a mailbox address.
Each user validated for telex and using the facility will incur a charge of 6 storage units a month. Further storage charges could be incurred depending on the amount of telex storage and the use made of short code and message file facilities.

Telemessages: £1.25 for up to 350 words.

Radiopaging: No charge.

If you have a BT Radiopager you can be paged automatically whenever a message is waiting in your mailbox.

International Mail: For the first 2,048 characters – 20p to Germany and Denmark; 30p to USA, Australia, Canada, Singapore, Hong Kong and Israel. For additional 1,024 characters – 10p; 15p.

These charges relate to the transmission of information by the Dialcom service to other Dialcom services outside the UK and the Isle of Man. Multiple copies to addresses on the same system host incur only one transmission charge.

Billing and Payment: All charges quoted are exclusive of VAT. Currently all bills are rendered monthly.

Software over the telephone

MicroLink is setting up a central store of software programs which you'll be able to download directly into your micro. The range will include games, utilities, educational and business programs, and will cover all the most popular makes of micros.

Talk to the world – by satellite

MicroLink is part of the international Dialcom network. In the USA, Australia and a growing number of other countries there are many thousands of users with electronic mailboxes just like yours. You can contact them just as easily as you do users in Britain – the only difference is that the messages from your keyboard go speeding around the world via satellite.

What you need to access MicroLink

You must have three things in order to use MicroLink: a computer (it can be any make of micro, hand-held device or even an electronic typewriter provided it has communications facilities), a modem (it can be a simple Prestel type using 1200/75 baud, or a more sophisticated one operating at 300/300 or 1200/1200 baud), and appropriate communications software.

MicroLink

in association with

TELECOM GOLD*

Application Form

I/We hereby apply to join MicroLink

(✓) ☐ I enclose my cheque for £5 payable to Database Publications as registration fee to MicroLink.

(✓) ☐ I also wish to use Telex. I authorise you to charge an additional £10 to my initial bill for validation.

☐ I confirm that I am over 18 years of age.

Signature

Date

I intend to use the following computer

FOR OFFICE USE ONLY:

Mailbox assigned

Start date

Password

SEND TO:
MicroLink
Database Publications
Europa House
68 Chester Road
Hazel Grove
Stockport SK7 5NY.

* *Telecom Gold is a trademark of British Telecommunications plc.*

Name

Position

Company

Address

Postcode

Daytime telephone

Commencement of Service
Please indicate month of commencement
Allow 10 days for validation of mailbox

☐☐ 19 ☐☐

Payment

Whilst Database Publications Ltd is the supplier of all the services to you, the commission and billing thereof will be handled by Telecom Gold as agents for Database Publications Ltd. Date of first payment to be on 15th of month following commencement.
Please complete billing authorisation form A, B or C below:

A. Direct Debiting Mandate *(Enter full postal address of Bank Branch)*

To

I/We authorise you until further notice in writing to charge to my/our account with you on or immediately after 15th day of each month unspecified amounts which may be debited thereto at the instance of British Telecommunications plc – TELECOM GOLD by Direct Debit. Bills are issued 10 days before debit is processed.

Name of Account to be debited

Account Number

B. Please debit my/our Access/Visa/*American Express account number
* *Overseas subscribers only*

I/We authorise you until further notice in writing to charge to my/our account with you on or immediately after 15th day of each month unspecified amounts which may be debited thereto at the instance of British Telecommunications plc – TELECOM GOLD. Bills are issued 10 days before charge is applied to your account.

Signature

Date

C. Please invoice the company/authority.

(✓) ☐ If you select this option, which is ONLY AVAILABLE to government establishments and Public Limited Companies, you will be sent an authorisation form for completion which will require an official order number to accept unspecified amounts.

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LORD OF THE RINGS
GAME ONE
MELBOURNE HOUSE

AT LAST! The eagerly awaited sequel to the fabulous classic "The Hobbit" is now available. "The Hobbit", classed as 'the ultimate adventure game of all time', was just a taste of what you can expect in LORD OF THE RINGS.
Astonishing vocabulary, graphics and more locations than you could imagine possible!

LORD OF THE RINGS Game 1 is available on C64, BBC, Spectrum and Amstrad at £15.95. This stunning package includes two cassettes, large booklet and a copy of "The Lord of the Rings" Part 1.

Micro papers take over bid

A NEWSPAPER war has broken out – but this time bingo cards and page three girls aren't involved.

The combatants are a subsidiary of Robert Maxwell's giant Mirror newspaper group and a family controlled Warrington firm.

And to the eventual winner will go the spoils of the lucrative school and college newspaper market.

For both companies have come up with software programs to produce newspapers and other text and graphics A4 material using a BBC Micro.

Goliath in the struggle is Mirrorsoft with its Fleet Street Editor package, while playing David is Advanced Memory Systems of Warrington with Pagemaker.

According to Nick Pearson, managing director of AMS – the company best known for the AMX Mouse – the first skirmish has already been held with Mirrorsoft making a takeover bid.

"They offered me a substantial sum for Pagemaker at the PCW Show, but I turned them down flat", he told *The Micro User*.

"It's a good job I did. For we made more money out of Pagemaker during its first month on sale than what they wanted to buy it for in the first place".

Starnet takes on MUD

TAKING on MUD at its own type of game is Micronet, which has come up with its own multi-user adventure for on-line BBC Micro users.

Called Starnet, it is a strategic space war game which up to 500 people can play simultaneously.

Star Captains must challenge, form alliances and attack their fellow gamers in a bid to determine the pattern of the galaxy and who will ultimately take control of its 3,000 stars.

*The game is played via mailbox and the Starnet Chatline, details of which can be found on Micronet page *800030 .*

Starnet was first designed by Mike Singleton, creator of Lords of Midnight. But it was so complicated to administer it was replaced, with his permission, by a new version written by Micronetter Lawrence Kirby.

Demand grows apace for 'old original'

THE original BBC Micro may have been pronounced dead but it seems it won't lie down.

Since Acorn revealed that it would no longer be manufacturing the Model B, dealers and distributors throughout the UK have reported a dramatic upsurge in demand for the machine.

"It's as though the news of its death has woken everybody up once again to how brilliant a machine it really is", one Northern dealer told *The Micro User*.

Such is the Model B's popularity that it has already established itself as number one in the second hand market.

One result of the interest boom is that some companies are already making plans to import the original BBC Micro from abroad.

Reports have been received of machines

Model B may be imported

arriving from Germany and even India as demand for the BBC Micro intensifies.

"We could sell double the amount if we could only get our hands on them", said David Fell, product manager of Watford Electronics.

"There are people around who are becoming desperate to get their hands on the old machine. It's a bit of a crazy situation".

His sentiments were echoed time and again by Acorn dealers contacted throughout the country.

"We could sell as many as we can get our hands on", a spokesman for Leigh Computer Systems told *The Micro User*. "Demand is incredible".

And over at Microworld an official commented: "We have two customers for every one machine at the moment. Find me the Model Bs and we can sell them".

Meanwhile the Model B has become the most sought after machine on the second hand front. It is currently commanding prices more than half the original price for models over two years old.

"Yet at that sort of age other micros are lucky if they fetch 25 per cent of their original price", said Doug Pinyon, editor of Micro Computer Mart, a magazine specialising in the used machine market.

"It's the sheer weight of numbers of the machines out there – and their continuing involvement in the educational scene – which will guarantee the interest in the old BBC Micro for a long time to come".

But why – if the Model B is still so popular – has it been dropped?

"At its level in the market and at its price the Model B was not making a satisfactory return of profit", says Valerie Holt, Acorn's corporate spokeswoman.

NO IBM BATTLE

ACORN is to avoid at all costs a head on confrontation with IBM in the lucrative office market.

This was made clear by company chairman Brian Long while he was the guest on Celebrity Chatline which is featured on Micronet.

Though admitting that Acorn is eyeing for sales to serious users, he added: "We are aiming explicitly at the scientific market. But we will not indulge in a full frontal attack on IBM in the office market".

Business upgrade

A HARDWARE and software package which will significantly expand the capabilities of the BBC Micro has been launched by Cumana.

The manufacturer says Upgrade will transform the normal BBC B into a viable business machine, technical workstation, low-cost Unix-type development, process control, or educational learning system.

The single board, which fits inside the computer, includes a Motorola 68008 microprocessor, 512Kb RAM expansion, a double density floppy disc controller, Winchester disc interface and a real time clock with battery back up.

Other features include serial and parallel port and ROM sockets providing up to 144kbyte.

Prices start at £695.

Micro works wonders with clumsy syndrome

SEVEN-year-old Matthew Walker is one of those children more likely to drop a ball than catch it. And he's the type of youngster prone to fall over the cat, or anything else in his path for that matter.

To put it bluntly, he's just plain clumsy.

Now that description is official. For the medical men have discovered that Matthew is suffering from the clumsy syndrome, a condition which manifests itself in his case in perception and coordination difficulties.

Not that Matthew is alone with his problem. An ever increasing number of children are being diagnosed as suffering from the same condition.

The only thing that is unusual about Matthew Walker's story is that he is fighting back with help from his parents and a BBC Micro.

Matthew ... making progress with his BBC Micro

When Alan and Anne Walker learned about their son's condition they decided they would do all in their power to combat the situation.

It was when Matthew reached three that they first felt something was wrong. For apart from showing signs of poor coordination, he had developed a tremor in his arms and hands.

"We took him for tests and were told he was suffering from this condition", local government officer Alan told *The Micro User*.

"Most other parents don't learn about it until the kids are found to be very slow at school".

On a visit to a child assessment unit near the family home in Marple, Cheshire, a consultant suggested that a micro might help.

So, Alan and Anne invested in a BBC Micro. Alan Walker described what this decision has meant to Matthew to date.

"His hand-eye movement has come on tremendously – and that's just from playing games.

"But it is the educational programs that have proved the real benefit. As a result of working with a spelling program he recently received 12 out of 20 in a school test.

"Though that was not among the top marks, it did show he was holding his own, and that in itself was a great achievement".

Mr Walker is now convinced that the BBC Micro can be an invaluable aid for children, like Matthew, with learning difficulties.

"It's the instant reward on screen that means so much to them", he says. "The teacher cannot match this in a normal school if she has a large class.

"What we try to do with the computer is complement what he is taught at school, not use it instead of a teacher.

"You see, we wanted Matthew to go to a regular school even though that presents so many difficulties for him. He has to try so much harder to keep up.

"But we feel he would not have come on so well if we had wrapped him up in cotton wool and sent him to a special school".

Mr Walker believes implicitly that it is the computer – and not the efforts of his wife and himself – that has enabled Matthew to keep up at school.

"The major feature is that he can use the computer on his own. And it is patient, it doesn't tire, it can repeat instructions endlessly without getting angry and shouting.

"So if you remember a normal child needs an awful lot of repetition when trying to learn, then a clumsy child needs that times a hundred.

"And that the BBC Micro can achieve for clumsy children everywhere".

COLOUR GRAPHICS

BBC Micro users can now economically produce full colour or black and white instant slides, photographic prints or overhead transparencies, using the Polaroid Palette Computer Image Recorder.

The package produces full colour slides and prints from computer generated graphics.

Because Palette does not photograph the computer's VDU screen it is not limited by the display colours of the computer – in fact it does not even require a colour monitor.

It improves the original screen image by filling the raster lines which makes colours more solid and saturated and curves less stepped.

The BBC Micro compatible Palette costs £850 including all hardware and software.

Run your own robot

TWO new interfaces have been released which enable the BBC Micro to be used in the external control of modular kits.

The first is a servo interface package from Surge Electronics and the second, the Interpack, from Commotion.

Surge's interface package allows the computer to control eight servo motors. It consists of the interface, software on cassette or 40 and 80 track discs and a manual which guides the user through the basics of computer control.

Its applications are endless – according to Surge. One servo can be used to perform a single task such as switching on a light, or all eight could control a sophisticated robot. Price £24.95.

Commotion's Interpack, designed by DCP Microdevelopments comes in two versions.

The first includes eight channel A to D, four switch inputs, four relays, eight bit input and eight bit output ports, and a DCP expansion bus. Price: £49.95.

Interpack 2 has six changeover relays, eight switch inputs and again a DCP bus. Price: £39.95.

To cut production costs DCP designed a universal interface which can be adapted cheaply for use with a particular computer – by plugging in a personality module or Intercard.

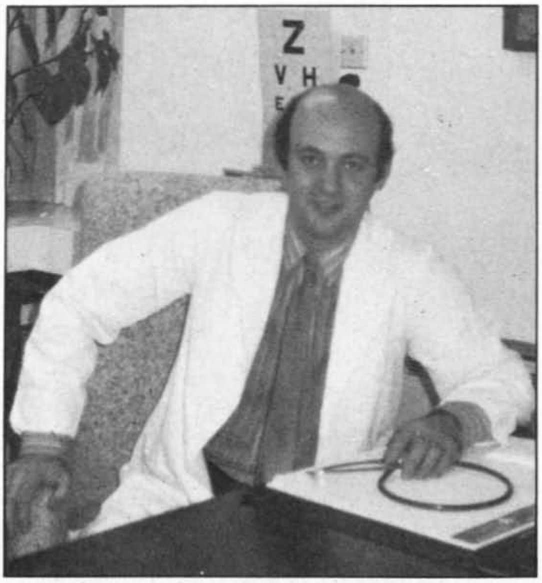
The Intercards are available for most popular makes of computers including the BBC Micro. It costs £21.70.

Commotion has also released a new temperature sensor package for the BBC Micro.

It consists of a probe, a plug, and programs to measure temperatures and to present results as a digital display on screen.

The probe, priced £40, can handle temperatures between −40°C and 130°C.

Meet the Micro Medic



FIRST there was the Radio Doctor. Then a posse of GPs popped up on our television screens. So, somewhat inevitably, the day has finally dawned for the Micro Medic.

And naturally enough he's equipped with a BBC Micro.

Dr Christopher Dobbing is the medical man involved. For when he's not tending the sick at a Hackney clinic, he's dispensing advice through his own medical bulletin board.

Known as Health-Data, it provides a regular diet of medical topics ranging from how to deal with drug abuse to the home management of minor ailments.

Dr Dobbing now logs up to 50 calls daily for his experimental viewdata service which was launched last August.

He describes his experiences to date in the January/February issue of *TeleLink*, the UK's leading telecommunications magazine.

"I felt here was a great deal of potential for private viewdata in the field of health information and education", he writes.

"As a general practitioner I found it difficult to get up-to-date information on local health facilities. I also discovered that many of my patients, especially the young, found the health information leaflets I gave them boring".

So although he had had no previous hands-on experience of micros, he decided that the answer might lie with a bulletin board.

"One of his reasons for this was because he was "impressed at how keen young people were to use computers".

He approached the local health authority only to discover officials had difficulty in understanding the concepts of viewdata.

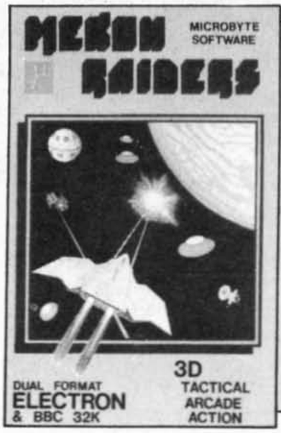
In the end he decided to go it alone, purchased his BBC Micro plus the necessary software, and within three months he was on-line.

Now he devotes an ever increasing part of his spare time to Health-Data.

How difficult has it been for a non-computer buff to run his own bulletin board?

"My seven-year-old son took about 40 minutes to work through a simple training programme, and is now able to produce very acceptable pages of text and graphics", writes the Micro Medic.

Health-Data is open round the clock on 01-986 4630.



Arcade action plus tactics

LATEST release from Microbyte Software, Mekon Raiders, is a tactical arcade action game for the BBC Micro.

The game starts with a number of Mekon Starbases entering the Federation Space sector in an attempt to destroy Earth. It is up to the player to work out which Starbase poses the biggest threat and take it out of action.

This involves two levels – battling off the aliens then descending to the Starbase and bombing its surface installations. Price: £6.95.

THE latest in the Linear Graphics range of plotters, the Plotmate A4M, claims to be unique in that users can select from a number of graphics languages to suit both the application and the host micro.

In the case of BBC Micro users, they simply select BBC graphics language to achieve total compatibility.

Other features include an on-board keypad allowing fast and slow cursor key control, a variable plotting window independent of the border indication function as well as auto-scaling.

Synthesiser's never lost for a word

A SPEECH synthesiser has been released for the BBC Micro which can carry on talking when others have to stop.

Called Speech, its designers Superior Software say it is the company's first "serious" software for the BBC Micro in two years.

And unlike some more expensive packages, it is said to have a limitless vocabulary.

To keep costs down Superior decided to offer it on cassette and not on ROM.

The program makes use of the micro's own sound chip, changing its pitch and increasing its speed a hundredfold to make speech.

It breaks the English language up into 49 different speech particles – the different vowel and consonant sounds – and the processor combines these to create words.

Speech requires no additional hardware and is made up of a suite of five programs.

They include a spelling program and one which will read back letters written on a word processor.

It costs £9.95 on cassette and £11.95 on disc.

Short examples of Speech have been included in the loading program of Superior's latest arcade adventure for the BBC Micro Citadel. And a cash prize is offered to lucky players of the game.

Aim of the game is to prevent impending invasion by solving puzzles to reach and deactivate a teleport system.

The first person to crack the game will win £200.

Citadel costs £9.95 on cassette and £11.95 on disc.

Micro brings new hope..

A PARTIALLY-sighted three-year-old girl is learning to "see" again, and it's all thanks to a BBC Micro.

Arwen Lockley commutes from her home in Stourbridge to attend the Research Centre for the Education of the Visually Handicapped at Birmingham University.

With the aid of a BBC Micro she and other sight-impaired children are being taught how to obtain and provide information in ways that are commonplace to people with good vision.

Each Monday to Thursday morning a playgroup operates at the centre, where children as young as one year old learn to use the micro's facilities.

With software developed by the centre they call up teletext with output in large print, synthetic speech and fully contracted braille.

Students write examination answers in braille, with examiners receiving a print version immediately without going through a live transcriber.

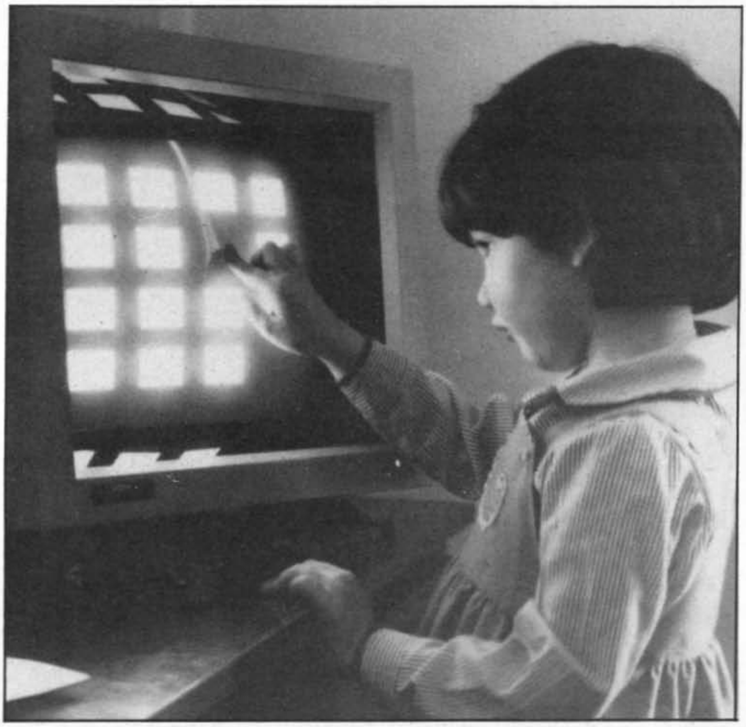
By pointing at a touch screen, the younger ones make coloured rectangles appear and disappear.

With other software they learn to choose the odd one out among geometric shapes of various sizes and colours. Displays can be altered by moving a joystick or by whispering and shouting into a microphone.

Children of 11 or 12 use computer assisted learning programs in maths.

With specially designed menus they choose and vary the size of print and the colours and brightness of the foreground and background of the visual display.

"The older children in particular become more outgoing and confident as a result of their newly-acquired skills", said a spokeswoman for the centre.



For Arwen Lockley – a touch of magic

Upgrade has comms capability

REVIEWERS are already predicting that Mini Office II will be an even bigger blockbuster than its predecessor – thanks to its communications link.

The communications module is just one of the enhancements to the original Mini Office, the revolutionary software package which transformed the face of low-cost business computing in the UK.

Yet another new feature for the only non-game to reach number one in the BBC Top Ten chart is label printing.

And the crack team of programmers behind the package has also improved the four early modules – word processor, database, spreadsheet and graphics.

But it is the new communications facility which is generating the most excitement.

"To buy that quality of software normally, you would need to pay four times the price of the whole package", one on-line expert told *The Micro User.*

The communications module offers a unique multi-colour facility – now available for the first time on a scrolling screen.

Users can choose from 16 colours – eight foreground and eight background, ranging from green to gold and magenta to required for the box.

A revolutionary type-ahead window is also included. This enables the user to check his commands as he types, even while text is still being received.

"The package would be worth it for the window alone", claims one reviewer. "It's invaluable for playing on-line games such as MUD or using real time chat systems".

An expanded Ascii hex transfer mode has also been incorporated. This allows the user to place non-Ascii files – such as machine code or word processing – on text only systems. Another facility is a break key which can be used to send break levels to remote systems.

All main features of the package are accessible from function key commands, so eliminating the need to constantly return to the main menu.

"We have made the communications module do everything but jump through hoops", said a spokesman for the team behind it.

School develops design program

A SCHOOL in Devon has developed a computer aided design woodworking program for the BBC Micro that has been especially written for pupils in the 11 to 16 age group.

The program asks pupils to select one of three styles of box – hinged, sliding or swivelling lid – and to choose a suitable timber for the box's construction.

It then asks for the overall dimensions. In response to this information the BBC Micro provides a perspective line drawing on the monitor screen and calculates the cost of the materials.

Using the cursor keys it is possible to "fly around" the box in any direction so that the image can be seen from other viewpoints.

It is simple to change the sizes of the box until the appearance is aesthetically pleasing and the cost is satisfactory.

Hardcopy is provided on a Penman plotter which includes a scale isometric drawing, the cost of the materials, and a cutting list of all that is required for the box.

The design package includes a 40 track disc, an instruction booklet and an audio cassette tape for £29.95.

Communications

A NEW communications package for the BBC Micro combines a low-cost, multi standard modem with software already described by one authoritative source as "a major step forward".

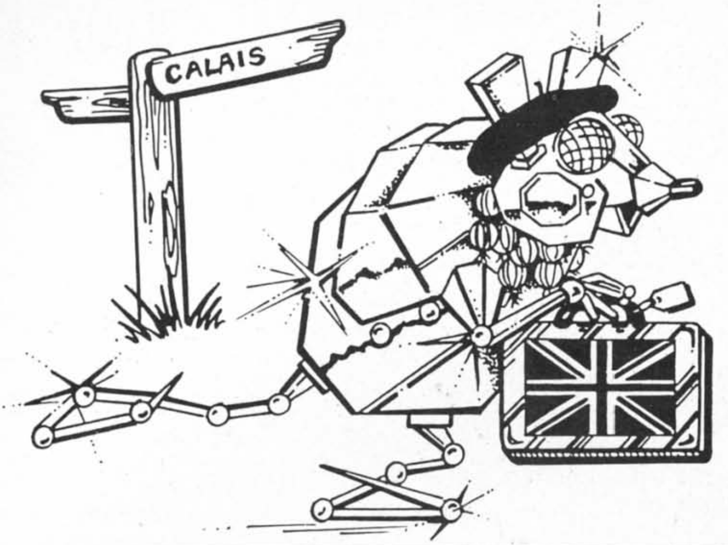
DataStar Systems has conjured up the Magic Modem and linked it with the latest terminal software known as Commpanion for £99.95 – a price the company claims is 50 per cent lower than any comparable product on the market.

Commpanion was commissioned by DataStar Systems from Softmachinery – the first Viewdata telesoftware terminal for the BBC Micro.

The new viewdata terminal is a full emulation of an intelligent terminal, while the text terminal has a scrolling teletype mode for use on PSS, MicroLink, Telecom Gold and a range of private bulletin boards.

An important feature of the 16k ROM software is its powerful directory system which allows single key access to databases with terminal configuration and a tagging feature for backtracking to a large number of pages.

Files can be transferred



AMX Mice invading France

BRITISH mice are currently launching an invasion of France – and it is all thanks to a company in Warrington.

Not the furry little creatures who nibble cheese, but those opto-mechanical devices beloved of UK computer buffs.

Advanced Memory Systems – creators of the acclaimed AMX Mouse for the BBC Micro – has revealed that it has shipped 5,000 of them to France.

It seems that the French are rapidly developing a liking for high class British peripherals.

"This shipment of 5,000 is only the first of what we hope will be many orders from Europe", says Nick Pearson of AMS.

A finalist in the Peripheral of the Year Award 1985, the AMX Mouse sold 10,000 units in the first nine months after its release for the BBC Micro.

"We feel that the French have shown remarkably good taste", says Nick Pearson. "Mind you, it's only fair when you consider how much of their wine we drink".

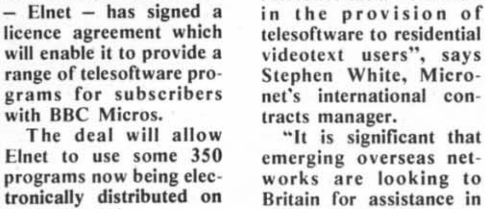
ISRAEL'S DEAL WITH MICRONET

ISRAEL'S fledgling national videotext service – Elnet – has signed a licence agreement which will enable it to provide a range of telesoftware programs for subscribers with BBC Micros.

The deal will allow Elnet to use some 350 programs now being electronically distributed on Prestel by Micronet.

"Elnet recognises that Micronet has a world lead in the provision of telesoftware to residential videotext users", says Stephen White, Micronet's international contracts manager.

"It is significant that emerging overseas networks are looking to Britain for assistance in getting off the ground".



touch of magic

error-free direct to their destination, using the Xmodem protocol.

With all normal facilities such as printing and baud rate selection, it has a full function viewdata editor which can handle any frame and which will allow text and graphic frames and mailboxes to be prepared on or off-line.

Frames can be saved and loaded from the current file system or printed to local or Econet printer and it has full specification CET telesoftware downloader.

Commpanion has already won rave reviews during field tests by both Micronet and Viewfax, the leading news services on Prestel.

"The new software seems to us to be a major step forward. It not only copes with Prestel but also with scrolling services using 80 columns", reported Viewfax.

The Magic Modem is designed and built to BSI 6305 standards and BABT approval is being sought.

The baud rates are 300/300 full duplex – 1200/75 viewdata – 75/1200 reverse viewdata 1200/1200 half duplex and the American Bell standards (export version only).

Textile designs by micro

TEXTILE company Harris Looms has developed a program for the BBC Micro which will give additional scope to the company's existing Dobby Designer packages.

The program, Weave Analysis, converts textile designs into weaving plans for looms.

Grids like squared paper are presented on the screen on which the textile designer can draw a weave pattern.

The BBC Micro analyses this into the draft and lifting plan required to set up and operate a shafted loom. Up to 24 shafts can be used.

Large weave designs may be built up from a library of smaller designs called motifs.

For designs featuring several motifs Weave Analysis uses CAD to produce a composite picture on the screen.

It computes the production plan for the weaver, calculates the number of shafts needed, how they are to be threaded up and in what sequence they must be operated to reproduce the cloth design.

The results can be viewed on screen or transferred to the existing Dobby Designer programs with facilities to show repeats, print and communicate directly with the loom.

Price of the program: £120.

Program for code crackers

CODE-breaking fanatics have been set a difficult nut to crack by Ross Reuter Research in its latest program for the BBC Micro.

Called Cabalist, it is a disc contains a series of interlinked programs which have been encrypted, protected and encoded using a variety of software devices.

Each part of the solution is either a codeword, a passage of text or an encoding algorithm – and these get harder as the user progresses.

Some of the more difficult parts are intended for real fanatics and will be time-consuming to unscramble, warns Ross.

The disc, price £12.50, is only available from the company and each buyer will be registered. Ross will then give the first three registered owners who solve the game before May 31 cash prizes ranging from £50 to £150.

If one of the encryption devices proves to be virtually secure Ross will then market it as a serious product for those who need to store highly sensitive information.

University WP

AYLMER Johnson, a don at Cambridge University specialising in engineering, got fed up with ROM word processing programs for the BBC Micro.

Either they were too slow, or required additional hardware, or they had such drawbacks as a 40 column screen.

So when he wasn't designing TV satellite dishes or re-designing bits of aero engine for Rolls Royce – just two of his extra curricula activities – he sat down and wrote his own WP program.

It was such a success that Cambridge research students are using it in their work, and now Professor Johnson is making it available to a wider public through Abbeysoftware.

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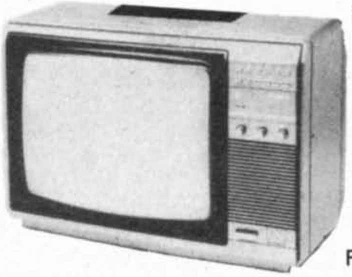

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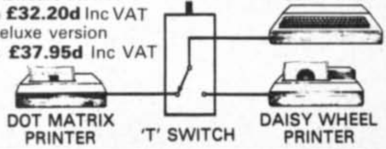

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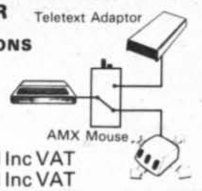

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Hilderbay software taken over

THE Hilderbay range of business software has been acquired by a new company called Centretime and will be made available for the BBC Plus.

Despite the popularity of its products over the past six years Hilderbay had run into difficulties which culminated in it going into voluntary liquidation.

Now Centretime has bought the entire rights to Hilderbay's Payroll, Invoicer, Book-keeper, and Statutory Sick Pay packages.

A Centretime spokesman told *The Micro User* his company was seeking dealer outlets for the four packages which are available on cassette or disc and cost £119 each.

DIY interfaces

A NEW range of construction kits for interfaces is to be released for the BBC Micro by Commotion.

Already on the market is the EP-05 Buffer Board for the BBC Micro or B+.

If offers a choice of eight inputs, eight outputs or a combination of four each.

An EP-05 printed circuit board and documentation costs £3.50, the PCB with ribbon cable and ICD connector £10, and the full component kit with connector cable £15.

All come with instructions, parts lists and construction details.

RAM boost

THE memory of the BBC Micro can be expanded by 64 mbytes using battery backed RAM discs from Morley Electronics.

The discs connect to the computer's 1 MHz bus, and software can be used with current disc or tape filing systems.

Access speed is about 1ms and transfer rate 128 kilobytes a second. Price around £200.

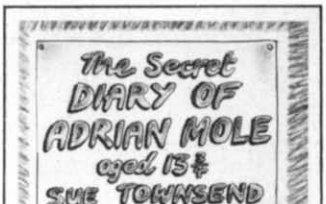
Chris wins comet competition

A BBC Micro-mad schoolboy has won first prize in a national computer competition about Halley's Comet organised by the Sunday Telegraph magazine.

Thirteen - year - old Christopher Jenkins, from Thornbury, Avon, spent over an hour a day for six weeks in his spare time writing his winning program about the Comet. Written on his father's BBC Micro, Christopher's program centres on the comet and the spacecraft Giotto which is speeding on its way to intercept it. Comprising several animated parts, the multi-sectioned program shows the orbit of the comet through the solar system and contains labelled diagrams of the comet and Giotto. The prizes for all Christopher's efforts were £75 worth of software and a book, The Pop-Up Book of the Universe, for himself.

There's also £250 for his school to spend on BBC Micro equipment.

Christopher was lucky enough to see the comet, which is visible only once in every 75 years, through a friend's telescope.



ADRIAN Mole – poet, intellectual and secret diarist – has conquered a new creative medium by becoming the subject of a computer game.

Based on Sue Townsend's best-selling books. The Secret Diary of Adrian Mole Aged 13¾ and The Growing Pains of Adrian Mole, the game enables BBC Micro users to become Adrian Mole and discover how they would cope with the problems that beset him over a year of his life.

"The object is to make me popular with everyone, which sounds dead brilliant", says Mole.

"It's an illustrated text game, which means you have artistic pictures to look at while you ponder about what to do next.

Written by Level 9 and published by Mosaic, it is available on cassette at £9.95, with a disc version £12.95.

TIMETABLES TO ORDER

CHANGING a timetable to give sufficient cover for exams or absent staff has been made simpler for those with access to a BBC Micro and disc filing system.

Yorke House Software has launched a staff substitution program called T-Cover for use with its existing timetabling package, T-Squared.

Already used by over 600 schools, T-Squared's error checking facilities prevent the timetable's compiler from double-booking a teacher or a room. The package also enables them to analyse timetable data.

The database, which can cope with up to 159 staff and a maximum of 50 periods a week, has 13 different print options and will display individual staff or class timetables, plus lists of free rooms and teachers.

T-Cover, when used with the database, allows the school to work out what staff cover it has for any day, chosen subject and period.

Three main lists can be printed out – absent staff and required cover, staff who can cover for them and reminder slips.

The database costs £40 and T-Cover £20. Both come in 40 or 80 track versions and each includes a manual.

Trilogy completed

THE Silicon Dream Trilogy for the BBC Micro has now been completed.

After 12 months work, software house Level 9 has released the long awaited follow up to Snowball and Return to Eden – The Worm in Paradise.

MicroLink
in association with
TELECOM GOLD

No. 6 February 1986

NEWSLETTER

Never a wrong note

THE European Community Chamber Orchestra is nearing the end of its busiest ever year, and MicroLink has been helping to ensure the group is as efficiently organised as it is artistically gifted.

And that's a big job – the orchestra has fulfilled a schedule of 60 concerts in the last 12 months, including the opening concert of Europe Music Year and tours of Holland, Germany, France, Belgium, Great Britain and Italy.

On top of all this the orchestra has released its first record, The Symphony in Europe, and has made two more recordings with Rudolf Barshai.

Fortunately the orchestra's artistic director Ambrose Miller is a MicroLink subscriber and is able to use the telex facility to keep in contact with agents on the continent.

Wide awake at weekends

ONE of the many drawbacks to traditional mail is that you can access it effectively only five and a half days a week.

If you have a letter that must be delivered on Monday you have to get it into your neighbourhood pillar box before midday on Saturday.

Otherwise you might as well tear it up as it won't be collected for nearly two more days.

For threequarters of the weekend pillar boxes are about as useful as chocolate teapots. Unless you're prepared to travel miles to a major sorting office you've no chance of getting your letter into the system.

However MicroLink subscribers can not only ensure first post Monday morning delivery of letters composed during the weekend – they can take their time writing them.

MicroLink's Telemessage service is open right up to 6pm on Sunday for guaranteed next day delivery at a cost of only £1.25 for up to 350 words. And to any address in the UK or USA.

Prime service

MICROLINK'S host network, Telecom Gold, has been forced to add one of the world's most powerful computers to its system in order to cope with the increase in demand for electronic mail.

The Prime 9955 costs close to £500,000, is capable of handling up to 256 terminals at any one time and has 16mbyte of memory.

Hot line to Japan

IT can get more than a little chilly in Japan at certain times of the year.

But the wife of the editor of a Japanese magazine won't be feeling the cold for some time – thanks to MicroLink Telemessages.

For her husband has just used the service to order her some of the finest cashmere sweaters from an exclusive boutique in the plush Burlington Arcade, London.

Yuichi Ishikawa edits the 4 x 4 Magazine of Japan and is a MicroLink enthusiastic, using it regularly to keep in touch with an associate company in Bristol.

"Somethimes I tap to MicroLink from a small telephone booth at countryside or from a railroad station", he told MicroLink.

"But besides my business, I think better communications mean a better world".

And obviously a happier wife.

FloraLink bridges memory gap

YEAR after year since he got married, Paul Watson has forgotten his wife's birthday, their wedding anniversary, even her Christmas present.

"So you can imagine what I've had to suffer as a result", says the 40-year-old accountant from Hull.

But now Paul will never be confined to the doghouse again for missing the special occasions.

As a MicroLink subscriber he became one of the first people to take advantage of the FloraLink service.

"My wife Pauline loves flowers, and suddenly I realised here was the answer. So now it will be flowers for every occasion – birthdays, anniversaries, the lot – all pre-booked to be delivered annually via FloraLink".

MicroLink joined forces with the world famous delivery service Interflora to create FloraLink, which for the first time ever enables people to send flowers or pot plants by way of their computer.

With 24 hours a day open access, deliveries by Interflora's 2,700 members throughout the UK and Eire can be made any day other than Sunday.

The selection includes freshly cut flowers, bouquets, wreaths and sprays and potted plants – all manner of sizes and specially shaped arrangements to suit the customer's pocket.

FloraLink carries a price list to provide subscribers with a guide to what is available and payment is made by credit card.

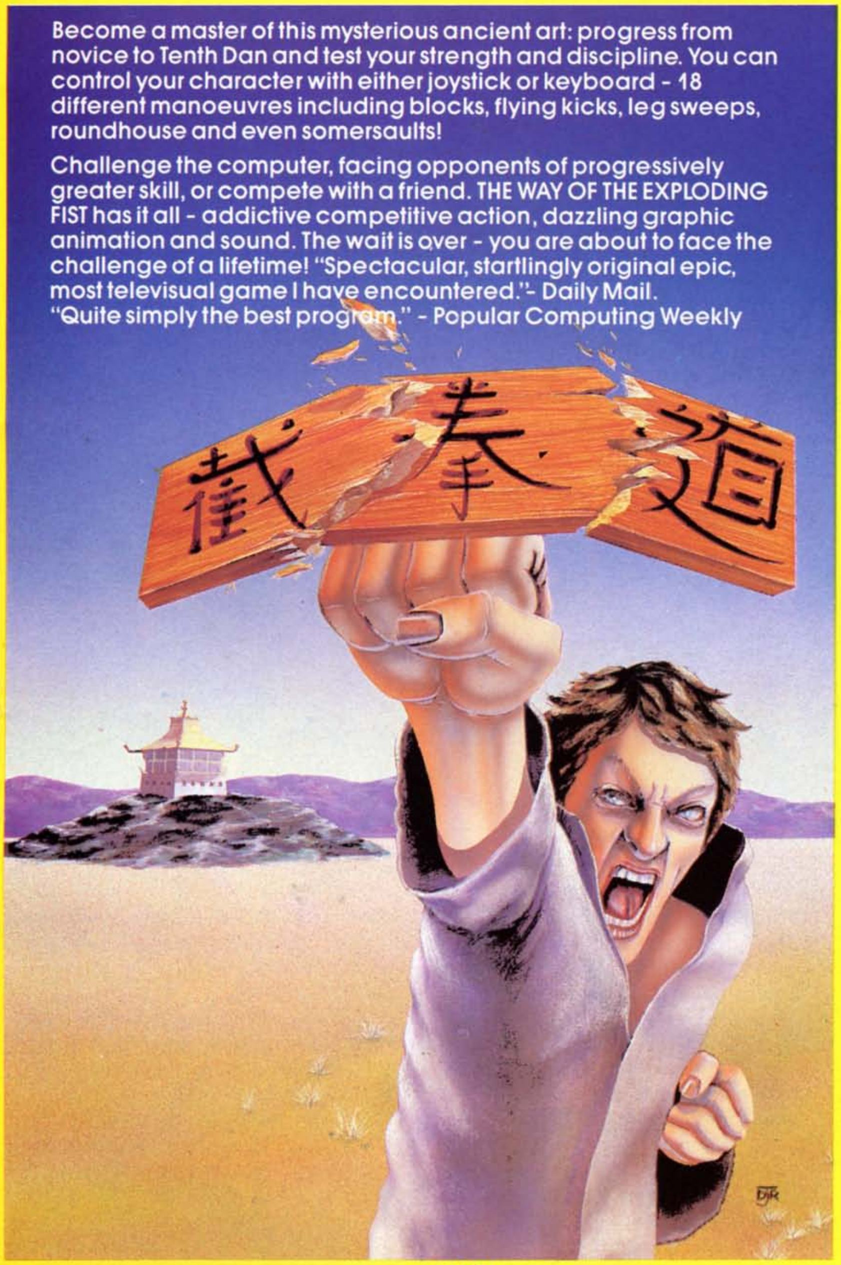
"It couldn't be simpler", says Paul Watson, "and what appealed particularly to me of course was to be able to leave a standing order.

"So this year I've gone the whole way. I've even ordered some flowers for Valentine's Day. I just hope they don't forget to put the card in, or Pauline won't have a clue who they are from.

"If there is one way to extricate yourself from the manure and come up smelling of roses, then it must be FloraLink for me".

YOUR chance to join MicroLink – Page 20

THE WAY OF THE exploding fist



Become a master of this mysterious ancient art: progress from novice to Tenth Dan and test your strength and discipline. You can control your character with either joystick or keyboard - 18 different manoeuvres including blocks, flying kicks, leg sweeps, roundhouse and even somersaults!

Challenge the computer, facing opponents of progressively greater skill, or compete with a friend. THE WAY OF THE EXPLODING FIST has it all - addictive competitive action, dazzling graphic animation and sound. The wait is over - you are about to face the challenge of a lifetime! "Spectacular, startlingly original epic, most televisual game I have encountered."- Daily Mail. "Quite simply the best program." - Popular Computing Weekly

"The Way of the Exploding Fist is virtually beyond criticism – technically brilliant and visually absorbing."

POPULAR COMPUTING WEEKLY

"Melbourne House's karate simulation explodes on to the Amstrad. This is a great arcade scoring game as well as wonderful family entertainment.
In Way of the Exploding Fist, Melbourne House have scored a great hit."

AMTIX

"As a sports simulation, this is one of the finest and most realistic we have seen. As an arcade game, it's addictive and pacy. It's clearly destined for the top."

SINCLAIR USER

"I can't tear myself away from this hit game, a karate contest called The Way of the Exploding Fist."

DAILY EXPRESS

"The graphics made my eyes pop out. Fantastic sound effects, state of the art animation and brilliant game play. One of those games that you can get out time and time again."

ZZAP

"By far and away the best sports combat simulation available. Exploding Fist on the Spectrum is the best game."

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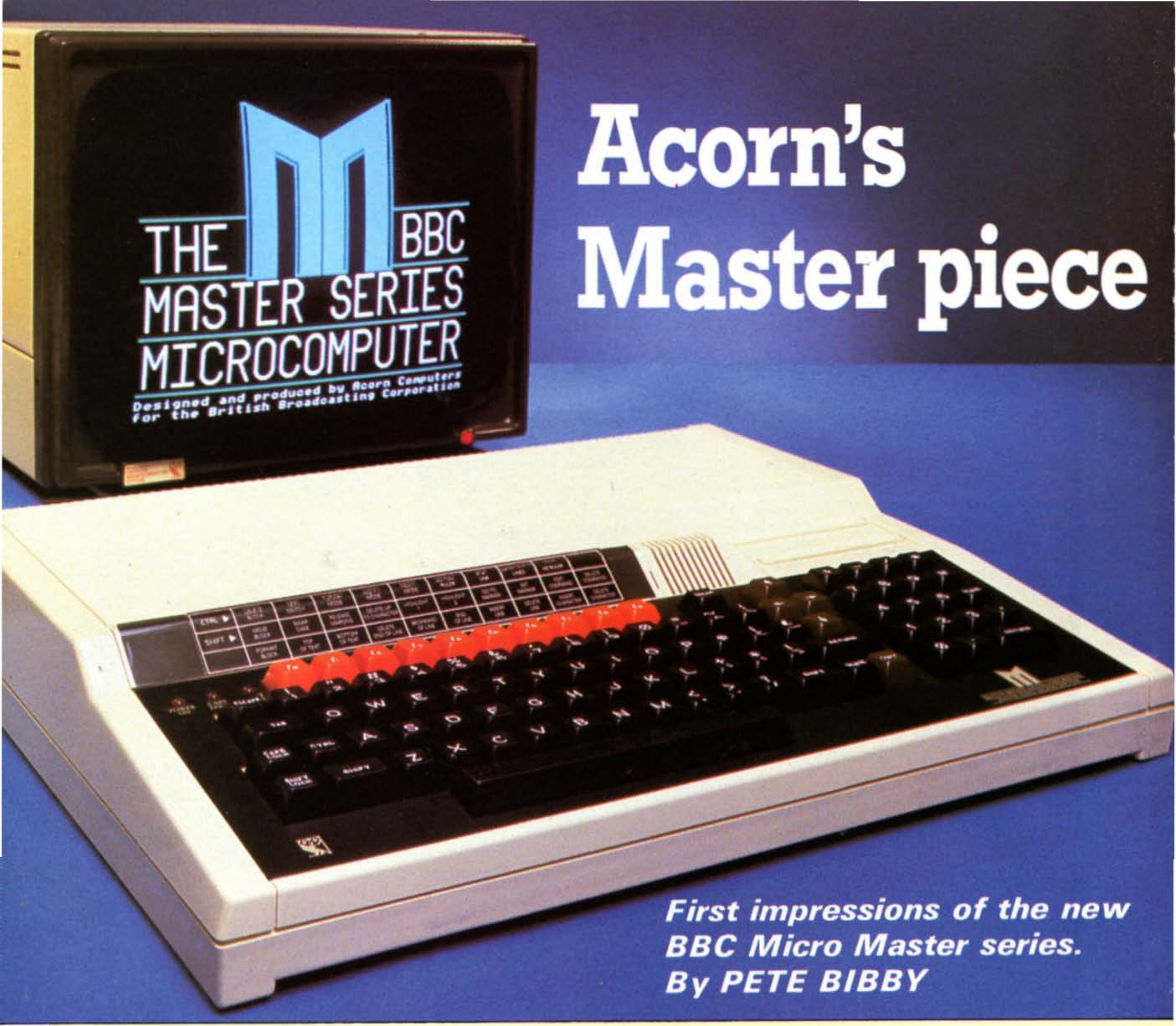
Acorn's Master piece


THE BBC
MASTER SERIES
MICROCOMPUTER
Designed and produced by Acorn Computers
for the British Broadcasting Corporation

First impressions of the new BBC Micro Master series.

By PETE BIBBY

IN a move that has stunned the computer pundits who had said the BBC Micro was dead, Acorn has launched not one, but a suite of five new models – the BBC Micro Master series.

Based on a core machine, the Master 128, the series is a careful selection of micros aimed at almost every conceivable category of user. It's also without doubt the most exciting new product from a British computer manufacturer since the original BBC Micro.

The basic Master 128 is a superfast BBC Micro using a CMOS version of the 6502 that runs at almost the same speed as the present 6502 second processor. This is because, while it's still clocked at 2 MHz, the chip's extra instructions have allowed Acorn to recode and so increase the speed of BBC Basic.

They've also been able to use some of the space saved to add new commands to enhance error handling and debugging. Hence the Basic in the new series is BBC Basic v 4.0.

First impressions are that the Master 128 is an updated, state-of-the art version of the old B+ and 128 machines. However there's a lot more besides. For a start it's got a "hump" behind the keyboard (of which more later).

The keyboard is slightly different, with a rather better layout of cursor and Break keys. And there's a mechanical device for locking the Break key.

To the right of these there's a numeric keypad, the keys of which are treated separately from keys of the same name on the main keyboard. For those who demand even more, all keys are user redefinable without losing memory space.

Still outside the box, the most obvious new feature, besides the hump, is the presence of two cartridge slots. These look exactly like the slots on the Electron's Plus 1 and, in fact, they will take Electron cartridge software. They'll also take ROMs up to the size of 256k. As well as supplying its own software in cartridge packages, Acorn will be providing empty cartridges to users and software houses for their own ROMs.

However the slots will do a lot more than just allow quick and easy fitting of ROMs. They also allow a 2MHz bus to be taken out via a suitable hardware cartridge, deal with sound input and output, and provide output to video recorders. No doubt third party suppliers will come up with other applications.

The other I/O sockets are the same as those found on the standard BBC B, rearranged into a more practical order. There is one addition – a phono link to send sound to an external speaker or pre-amp. And, tantalisingly, a perforated piece of the back wall corresponds to a large empty space within the micro. A built-in modem perhaps, or an interface to a space-age form of storage?

THE MASTER 128

- ***CPU:** The chip at the heart of things is the 65C12, a CMOS version of the 6502 clocked at 2 MHz.*
- ***RAM:** 64k main memory plus 64k sideways RAM in four 16k pages. 50 bytes of this is battery backed with 10 bytes available to the user. Available RAM isn't affected by the filing system.*
- ***ROM:** A huge (in capacity, not size!) 128k chip contains the Operating System and bundled software. The OS has extended graphics commands allowing colour mixing and also includes terminal software. The bundled software comprises: BBC Basic v 4.0 (enhanced Basic), Edit utility, View v 3.0, Viewsheet, ADFS (double density), 1770 DFS (B+ compatible). There are also three internal sockets for extra ROMs plus two cartridge sockets, each of which can take ROMs up to 256k.*
- ***Input/Output:** All the standard BBC ports are available, although rearranged. The fully-buffered tube is divided into an external tube and an internal tube (to service the upgrade boards). There is also a phono socket. In addition the cartridge sockets provide a 2MHz bus, Video Genlock and sound input and output capability.*
- ***Keyboard:** Normal BBC keyboard layout but with the positioning of the Break and cursor keys improved. The Break key can be locked mechanically and the whole keyboard is even more robust than previous models. There is also a 20 key numeric pad. The character set can be redefined without loss of user RAM.*
- ***Display:** All eight standard modes are available plus eight shadow modes. The UHF output has been improved to allow 80 column screens to appear clearly on a domestic television.*
- ***Real time clock:** Battery backed, this gives time, day, date and year data to Basic and the OS.*
- ***Econet:** Optional network interface plus 16k Advanced Network Filing System ROM.*

When you look inside the machine – and you're allowed to lift off the lid – it's obvious that it has been completely redesigned. The chip count has been almost halved from earlier models, with Acorn being justly smug about the five custom chips used, each of which worked first time back from the silicon foundry.

The major feature of the board is that it is designed for expansion. Two slots are ready to take one of the three modules available to turn the Master 128 into one of the other micros in the series. The boards just slot in, and it's seemingly impossible to put them in the wrong way.

One sizeable feature of the PCB is the 128k (megabit) chip that contains the machine operating system (MOS) and all the bundled software. Hidden away in this are the enhanced Basic, View, Viewsheet, the program editor utility and two disc filing systems.

The MOS not only runs the system, it also contains extended graphics commands from the Graphics Extension ROM and terminal software. All eight graphics modes are available as well as eight "shadow" modes using the sideways RAM.

Why two filing systems? Well the philosophy of the Master series is to provide as much compatibility – plug, software and media – with the existing BBC range as possible. To do this it was necessary to incorporate the standard 1770 DFS. However with increased RAM comes increased storage requirements, so a double density system is desirable. Hence the second DFS, the Advanced Disc Filing System beloved of Electron users with Plus 3s.

The result is that a BBC owner can move to a Master Series micro and still use his existing disc software and disc drives. I have little doubt that most will one day want to change to 80 track double sided double density to make full use of the potential of the Master series.

Incidentally, the filing systems can be used without affecting PAGE, which can stay placidly at &E00.

Also on the board are three ROM slots, though probably the cartridge ROMs will tend to overshadow these. Happily you don't have to unscrew the keyboard to get at them – a good job as the keyboard is attached much more securely than in older models.

‘The most exciting new product from a British computer manufacturer since the original BBC Micro’

With the board's revamp comes a new power supply unit. This gives more power though Acorn, paradoxically, says it uses only as much as the old models. They also say that the board has been designed to run cool, so overheating problems should be a thing of the past.

While I can't admit to have explored it thoroughly, the memory map looks much as the BBC 128's with 64k of RAM main memory and four pages of 16k each. And, of course, *SHADOW options of the B+ are available.

What is interesting is that some of the locations are set aside for system, user and third party use and these are battery backed. In other words they remember what's in them even when you've switched off.

This allows you, among other things, to have the machine configured as you want when you switch it on again. It could wake up in View with the ADFS selected or, given the right cartridge, in Pascal. The battery is a lithium type which also supplies power to a real time clock that's available from Basic.

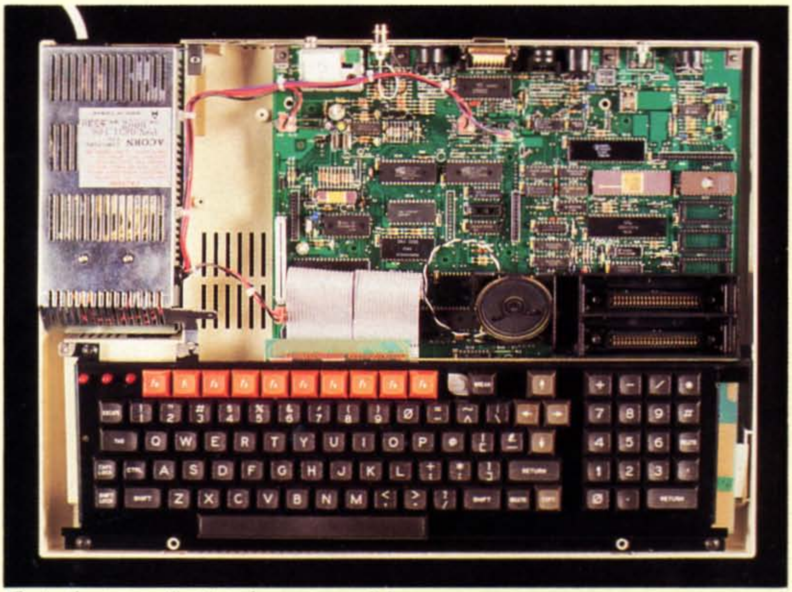
Exciting as it is, the Master 128 is only the foundation machine. Three upgrades are available in the form of boards that slot into place under the hump. These packages can be sold as a whole or as an upgrade to the Master 128s. Fitting the card is said to be foolproof and doesn't void the warranty, as was the case with older versions.

The boards can be considered as internal second processors. Because of this, the Master has two Tube interfaces, one internal Tube to enable the Master 128 to communicate with the board, and the familiar external Tube. So if you want you could have one of the Master series with a second processor on an internal board and, say, a Z80 second processor hung on the outside.

Incidentally, all the upgrades in the series have the Master 128 as the basic unit, so everything mentioned above applies to the Master Turbo, the Master 512 and the Master Scientific micros.

The first, and cheapest, upgrade produces the Master Turbo. This equates to an internal 6502 second processor, except it's faster than the external version, running at 4MHz. Along with it comes an enhanced Hi-Basic, Hi-Edit and Printer-Buffer

→



The inside story . . . the Master's secrets revealed

extender on disc. View is automatically relocated from the main board.

While at the time of writing prices haven't been finalised, the projected price of the Turbo board is so good that I'm sure that most users will either go for a Master Turbo as their first buy or buy the Master 128 with the aim of getting a turbo card as soon as possible.

Next in the series is the Master 512. As you might guess, this gives 512k of memory. What you couldn't guess from the name is that its processor is a 16 bit chip, the 80186.

Obviously aimed at the small businessman, it runs the DOS+ filing system from Digital Research, allowing some degree of IBM compatibility. It's also supplied with DOS 4.1, a version of DOS+ allowing concurrent programming (multi-tasking). And, as windows are very much in, added to this is the Gem environment comprising Gem Paint, Gem Desk Top and Gem Write.

THE MASTER TURBO

THIS has all the features of the Master 128 plus:

- *65C012 8 bit CMOS chip clocked at 4MHz with 64k of ROM.*
- *View automatically relocated on transfer from Master 128 CPU. Hi-Basic, Hi-Edit and a printer-buffer extender supplied on disc.*
- *Operating system support for parallel processing.*

THE MASTER 512

THIS has all the features of the Master 128 plus:

- *80186 16 bit chip with a clock frequency of 8MHz, plus 512k RAM and ROM capacity up to 256k.*
- *DOS+, a disc operating system giving compatibility with MSDOS 2.1 and CP/M 86.*
- *Acorn mouse.*
- *GEM environment: GEM Desk Top, GEM Paint, GEM Write.*

Last in the series, with an internal second processor, is the Master Scientific. This is the top of the range and something to dream about. The board is essentially the 32016 32 bit second processor with 512k of RAM. This means that the Master series ranges from 8 bit all the way to 32 bit micros. There's even a separate processor for floating point arithmetic on the board.

The Scientific has bundled with it on disc the high level languages Pascal, Fortran and C as well as a 32016 assembler and Panos operating system. Certainly it's the ultimate BBC machine, and seems to beg for a hard disc.

And that's where the upgrades stop. Remember that each machine has as its core the Master 128 and the only difference is the board that's slotted in. So if you were rich I suppose you could have one Master 128 and create the Turbo, 512 and Scientific at will by adding the appropriate board to that one micro. I doubt if that will ever happen, but the idea does show you how the system works.

THE MASTER SCIENTIFIC

THIS has all the features of the Master 128 plus:

- *National Semiconductor 32016 32 bit chip with 512k of RAM and 16k of ROM containing the tube communications code and Pandora operating system core.*
- *NS32081 floating point processor.*
- *On disc: Fortran 77, ISO Pascal, C, BBC Basic v 4.0 (equivalent), 32000 series macro assembler, Panos operating system.*

However, I've only mentioned four Master series micros. There is a fifth micro and this, surprisingly enough, is a "downgrade", the Master Econet Terminal.

It's basically a Master 128 without all the things a micro on an Econet system doesn't need, such as cassette port, RS423 and so on. This asset stripping leaves a much cheaper computer that can be linked to an existing Econet system. The original board remains, so that the extras can be added later as desired, though, unlike fitting the Master boards, this will need some electronics skills.

And that's a brief look at the BBC Micro Master series, a suite of micros whose compatibility, flexibility and utility is a pleasure to behold.

Once again, Acorn has got it right and produced a new concept in home computers. Maintaining upwards compatibility with earlier models, we have a huge increase in power and flexibility.

Whatever your use for a micro, there's something in the Master series to suit everyone.

● *There'll be a complete hands-on evaluation of The Master in next month's Micro User.*

THE MASTER ECONET TERMINAL

- ***RAM:** The memory map is the same as the Master 128.*
- ***ROM:** 64k, consisting of 32k OS, 16k BBC Basic and 16k Advanced Network Filing System.*
- ***Input/Output:** Network interface card fitted as standard, RGB and composite video, Internal tube, Cartridge sockets, 6522 User VIA available as option.*

PHONE FOR NEW LOWER PRICES

CANON PW-1080A OR KAGA TAXAN KP810

NEAR LETTER QUALITY PRINTER

NLQ Mode 23 × 18 Matrix: 27 cps
Draft Mode 11 × 9 Matrix: 160 cps
Full range of Epson FX 80 Print Codes
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Centronics Interface Standard
CANON PW-1156A Available
(Accepts 17" Paper)

CANON PW-1080A £265.22 + VAT = ~~£305.00~~
CANON PW-1156A £360.00 + VAT = ~~£414.00~~
See below for Printerpack prices

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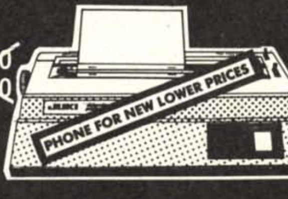
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Low Prices

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5. Text Dump Program
6. Function Key set up Program.
7. Function Key Label Printing Program.
8. VIEW Printer Driver
9. 100 Sheets of Paper
10. Mains Plug with 3 Amp Fuse
11. Booklet giving details of using the printer with a BBC
12. Character Defining Program for Downloadable-character-set (draft mode)

CANON PW-1080A	**BBC PRINTER PACK £ inc VAT**
CANON PW-1156A	**BBC PRINTER PACK £**
JUKI 6100	**BBC PRINTER PACK**
STAR SG10	**BBC PRINTER PACK £295 inc**

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10, 12, 15 & Proportional Spacing
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Underline; Backspace + Lots more
Centronics Interface Standard
RS 232 Interface £54.00 + VAT Extra
Tractor Feed £119 + VAT Extra
Single Sheet Feeder £199 + VAT Extra

JUKI 6100 £330.43 + VAT = ~~£380.00~~
See left for Printerpack prices

RING FOR SAMPLE PRINTOUT, FULL SPECIFICATIONS & LATEST PRICES

PHONE FOR NEW LOWER PRICES

STAR SG10

NEAR LETTER QUALITY

NLQ Mode 17 × 11 Matrix
True Descenders 9 × 9 Matrix
120 CPS Bidirectional & Logic Seeking
40, 48, 68, 80, 96, 136 cpl
Italics, Emphasized, Double strike
Super & Sub Scripts
Downloadable Character Set
Hi-Resolution & Block Graphics
Friction or Tractor Feed
10" Carriage
See above for Printerpack prices

Centronics Interface,
Standard RS232 Inf.
£58.00 + Vat Extra

STAR SG10
~~£270.00~~
inc. VAT

Top Service

WIN A PORSCHE 924S when you buy a STAR SG10 from CJE
Written details on request.

FONTAID

NLQ Designer for Canon and Taxan Kaga NLQ Printers.

Design your own NLQ fonts or 'download' one of our 20+ predefined fonts. The FONTAID disk includes the following type styles:
Square, Outline, Gothic, Computer Type Style, Bold, Shadow, and Broadway.

Additional Disk 'A' includes:
Greek/Maths, Script, Proportional Spacing, Plain, Handwriting and 2 styles of (Elite, Condensed, Super Condensed).

FONTAID requires 6264 RAM Chip in printer
FONTAID (BBC) £30.00
FONTAID (BBC) with 6264 RAM £36.00
FONTAID Additional Disk 'A' £15.00
Please state 40 or 80 track when ordering.
ROMS of individual fonts are available and can be used with any computer.
FONT ROMS .... £18.00 each
P & P on FONTAID £1.00

Please phone for FONTAID leaflet and demonstration print out.

Coming Soon MULIT-FONT NLQ printing for Epson MX/RX/FX/LX and Epson compatibles.
Design your own font or use supplied predefined font.

Please phone for latest details.

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FULL RANGE OF CONNECTORS & CABLES AVAILABLE
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CJE micros

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PRINT QUALITY

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Tel: Watford (0923) 37774/40588 Telex: 8956095 WATFRD
Credit Card Orders (ACCESS & VISA) Tel: (0923) 33383 or 50234 (24 Hours)

Watford Electronics' overseas Distributors:
Absolute Electronics, 483 Centre Road, Bentleigh, Victoria, Australia 3204. Tel: (03) 557 3971
First Ludonics International, 2400 AJ Alphen aan den Ri jn, Nedherlands. Tel: 01720 72580.

BBC B Plus (64k)	**£369**
BBC B PLUS with 128K	**£399**
BBC B PLUS with Econet	**£389**
Extra 64k Upgrade Kit	**£32**
1770 Upgrade Kit	**£42**

SPECIAL OFFER
THIS MONTH

Wordwise + worth £50 FREE with every BBC B+ purchased from us.

6502 Acorn 2nd Processor package	**£175**
Z80 Acorn 2nd Processor package	**£339**
TORCH Z80 Card + Perfect Software	**£225**
TORCH Z80 Card+Soft. + Disc Pack	**£399**
Acorn Bitstick	**£325**
Acorn IEEE Interface Complete	**£280**
Acorn Teletext + Interface	**£195**

(Securicor carriage on Micros £7)

Dust Cover for BBC Micro

£3.50

VARIOUS PRINTERS

● EPSON RX100	**£342**
● EPSON FX80 Printer	**£259**
● EPSON FX100 Printer	**£429**
● EPSON JX-80 Full Colour Dot Matrix Printer. Prints in 7 Colours. Upto 160 cps	**£499**
● EPSON Hi-80 Printer Plotter	**£345**
● EPSON Paper Roll Holder	**£17**
● FX80 tractor attachment	**£37**
● SEIKOSHA GP50A & GP50S	**£69**
● Centronics Printer Cable to interface all the above Printers to BBC	**£6**

(Securicor carriage charge on printers £7)

EPSON LX-80 PRINTER

EPSON's new Low cost High performance printer. Print speed 100 cps, NLQ mode 22 cps, 9 needle print head. Full FX-80 capability is supported with downloadable fonts. Friction feed is supplied as standard. A tractor feed and an attractive & useful Auto Sheet Feeder as optional extra.
NLQ Mode and current typeface selectable from front panel.

Price: **£215** (carr £6)
Tractor Feed Attachment **£20**
Single Sheet Feeder **£49**
Spare Ribbons **£4**

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	**£25**	RS232 + 2K Buffer	**£55**
IEEE 488	**£62**		

Official ACORN Distributor

CENTRONICS GLP (NLQ) Printer

A major price break-through in NLQ Printers from Watford

At last, a full feature Epson compatible NLQ printer at a price that everyone can afford. Due to Watford's bulk purchasing power and low margins we can now offer this incredible printer deal direct from the manufacturers to our customers.

The Centronics GLP features a near letter quality (NLQ) mode using a 23 by 18 dot matrix for each NLQ character (this is the same as is used by the very popular Kaga Taxan printers).

Single, double and quadruple density graphics modes as well as four character widths and super/sub script printing are also supported, along with many other facilities normally found on printers costing twice as much.

Although the GLP is a very compact printer, it can handle paper up to 10 inches wide. Friction feed is supplied as standard with a low cost tractor feed available as an optional extra.

The GLP is a bidirectional logic seeking printer with a 9 needle print head and features a long life ribbon cartridge. The GLP is supplied with a Centronics parallel interface and comes complete with a ready fitted NLQ font ROM containing a different and more pleasing type face (other font ROMs available, including Gothic, Courier, Italic, Copper Plate, Script, Double, Bold etc.)

Now available in Serial/Parallel or IBM compatible. Please specify.

Send an SAE for further details of the GLP NLQ Designer and extra font ROMs.

Special Offer ***£107*** *(carr £5)*

Tractor Feed Attachment **£9**
NLQ Designer ROM **£20**
Individual FONT ROM **£15**

BROTHER HR-15

Brother HR15 is a high-quality daisy-wheel ideal for a budget printer for serious use. Notable features of this printer include a 3k buffer, 18cps (max), bi-directional proportional spacing, Centronics interface standard, (RS232 optional), optional Sheet Feeder and Keyboard.

ONLY **£315** (carr. £7)

Single Sheet Feeder	**£185**
Electronic KEYBOARD	**£135**
TRACTOR FEED Attachment	**£84**

Ribbon Cartridges:
Fabric **£3;** Carbon **£3;**
Multistrike **£6**

DAISYWHEELS (various typefaces)	**£18**

We are now offering at no extra cost ON-SITE 12 months maintenance on all HR15 Printers purchased from us.
W.E. GIVES YOU A GREAT DEAL

Listing Paper (Perforated)

1,000 Sheets 9½" Fanfold Paper	**£7**
2,000 Sheets 9½" Fanfold Paper	**£13**
1,000 Sheets 15" Fanfold Paper	**£9**
Teleprinter Roll (Econo paper)	**£4**

Carriage on 1,000 Sheets £1.50

SPECIAL OFFER

KAGA KP810
NLQ PRINTER

This rugged printer is made by Canon of Japan and is the same as Canon PW1080. It is fully Epson FX80 compatible and offers superb NLQ printing.

Our Price: ONLY ***£195*** (£7 carr.)

Kaga RS232 Interface	**£49**
Kaga RS232 Interface + 2K Buffer	**£69**
Kaga RS232 Interface + 16K Buffer	**£95**

KAGA KP910 Printer

Similar to the KP810 but with 17" carriage for wide print. Gives 156 columns of normal print or 256 columns in condensed mode. Ideal for printing out spreadsheets.

ONLY **£339** (£7 carr.)

PRINTER LEAD

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	**£6**
Extra long (6 feet long)	**£8**

We can supply leads to any required length.

RS232 Cables available in any length and any combination. Please telephone for your requirement.

PRINTER RIBBONS & VARIOUS DUST COVERS

Type	**Ribbons**	**Dust Covers**
FX100	£10.00	£5.25
FX80/MX80	£4.50	£4.95
RX80	£4.50	£4.50
LX80	£4.00	£4.50
GP80/GP100	£4.50	£4.00
GP250	£5.95	£3.95
Centronics GLP	£4.00	£3.75
KAGA KP810	£5.25	£4.75
CANON PW1080	£5.25	£4.75
MICROVITEC MONITORS	–	£5.50

Our attractive Dust Covers are manufactured from translucent PVC. The seams are stitched and edges are taped to prevent splitting due to continuous use.

SEIKOSHA SP-1000

Attractively finished Dot matrix printer. Prints in Near Letter Quality mode as well. 100 CPS in draft mode; Bidirectional Logic seeking; Auto paper loading; Variable paper width; Has variety of Character sets; Underlining; Bold print; Double strike, etc.

ONLY £175 (carr £7)

PRINTER LABELS
(On continuous fanfold backing sheet)

1,000 90×36mm (Single Row)	**£5.00**
1,000 90 ×36mm (Twin Row)	**£4.90**
1,000 90×49mm (Twin Row)	**£7.50**
1,000 102×36mm (Twin Row)	**£6.25**

Carriage on 1,000 Labels £1.00

We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop. All Monitors are supplied complete with connecting lead.

MICROVITEC 14"

● 1431 – Medium resolution as used on the BBC television computer programme	£179
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● 1431AP RGB + PAL and AUDIO	£199
● 1451AP RGB + PAL and AUDIO	£269
● Dust Cover for Microvitecs	£5.50

KAGA/TAXAN 12"

● KAGA KX1201G Hi-res Green Monitor	£90
● KAGA KX1202G Ultra-Hi-Res Green Monitor	£105
● KAGA KX1203A Ultra-Hi-Res Amber Monitor	£105
● KAGA Vision 2, Hi-Res, RGB Colour Monitor	£225
● KAGA Vision 3, Ultra Hi-res, RGB Colour; Text mode switch allows monochrome text display in either Green/Amber or White reverse	£335

PHILIPS 12"

● BM7502 Hi-Res Green	£74
● BM7522 Hi-Res Amber	£77

FIDELITY COLOUR MONITOR

- Medium Resolution, attractively finished, 14" RGB and Composite VIDEO/AUDIO Input. Has a detachable anti-glare screen.

£169

ZENITH

"Test Bureau Recommended for use in Education".

12" high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read.

Green (New Design) Hi-res	£72
Amber (New Design) Hi-res	£76

LEADS

BNC Lead for Zenith or Philips	£3
RGB lead for KAGA	£3

N.B. Carriage on Monitors **£7** (securicor)

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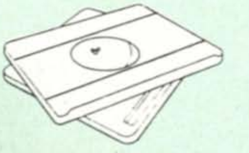

Adjust your Monitor/VDU, Up, Down, Right or Left to provide utmost in operator flexibility & Viewing comfort. It improves your sight lines & reduces stress & eye, neck and back strain. Available in 2 sizes:

for 12" Monitors **£14**
for 14" Monitors **£16**
(carr. £2.50)

4 COLOUR PLOTTER PRINTER

SAKATA SCP-800 printer/plotter facilitates plotting & printing in 4 colours on paper upto A4 size, using easily replaced pens. In text mode it prints upto 12 CPS. Max 160 Char. per line. In graphics mode it offers full plotting facilities incl. drawing, moving, scaling of text, rotation & drawing of axes. (Write for a sample printout).

Only £149

Set of 4 SPARE PENS only **£4.50**

SPECIAL OFFER

HITACHI EPROMs for Sideways ROMs

2764-250nS £2
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RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards

6264LP (8K) £3.75
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PRINTER SHARERS

Connects	
3 BBC Micros to 1 Printer	£65
6 BBC Micros to 1 Printer	£129

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE
BBC B Plus (64K) Micro; Wordwise ROM: Twin 800K Double sided Mitsubishi Disc Drives; Hi-Res Green Monitor; Brother HR15 professional quality Daisywheel printer; Discdata (database) & Beebcalc (spreadsheet analysis) software packs; Pack of 10 Diskettes; 4 way mains trailing socket; manuals and all leads.

NEW LOW PRICE

Only £999

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

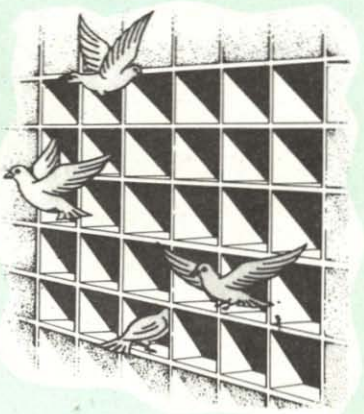
It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

This book is superb value at only
£5.95 (Book – No VAT)

This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette or disc.

Only **£23**

DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.

On disc at **Only £17**

(Please specify 40 or 80 track when ordering)
(Please write in for technical specifications)

FILE-PLUS

File-Plus is a powerful database for the BBC micro with many advanced features. Largely menu driven, File-Plus is provided on a 16k ROM with some extra utilities on disc. Features included are detailed below:

- Flexible full screen form layout.
- Built in File Query Language (FQL).
- Printer Output.
- Arithmetic operations in FQL.
- Looping in FQL.
- Number range of +– 9999999999.9999.
- File linking allows files over different drives.
- Multiple forms allow selection of displayed data.

Only £32

(Please specify 40T or 80T disc

DATAGEM

Gemini's 24K ROM based DATABASE Management System

Special Offer: **£67**

Continued →

The ULTIMATE DFSs for the BBC MICRO

WATFORD TOPS THE DFS CHART

Watford's Ultimate DFS has scored highest points in ACORN USER's unbiased DFS's Review of July 1985.
In concluding, the reviewer writes "It must be said that Watford's DFS certainly offers a comprehensive range of facilities at a very attractive price". (Please write in for comprehensive details.)
To celebrate the occasion, we are offering Watford's complete Disc Interface Kit at only £56 and the Double Density Unit at £58.

Just compare the features:

Features	Acorn	Watford	
	1.20	Single Density	Double Density
Max nos. of files per disc side	31	62	62
Max disc capacity	800k	800k	1440k
Tube compatible	Yes	Yes	Yes
Built-in Editor	No	Yes	Yes
Built-in Formatter	No	Yes	Yes
Built-in Verifier	No	Yes	Yes
MRUN a file	No	Yes	Yes
MLOAD a file	No	Yes	Yes
Extended RENAME	No	Yes	Yes
Selective COPY	No	Yes	Yes
Default file name	No	Yes	Yes
Disc space distribution	No	Yes	Yes
40/80 Software Switchable	No	Yes	Yes
Wide catalogue	No	Yes	Yes
Close open files	No	Yes	Yes
Improved OPENOUT	No	Yes	Yes
Copy between densities	N/A	N/A	Yes
OSWORD &7F	Yes	Yes	Yes
Full entry point compatibility	Yes	Yes	Yes
Retain information over a break	1.20 partial	1.43 Yes	1.53 Yes
Games compatibility	Yes	Yes	Most
Econet file server	Yes	Yes	Yes
Econet station	Yes	Yes	Yes
Full wildcard facilities	No	Yes	Yes

WATFORD's & ACORN's SINGLE DENSITY DFS

Watford's popular and widely acclaimed DFS has now been available for three years, and has gained a large following amongst serious users of the BBC Micro. Owners of Acorn or any other standard DFS can upgrade to our "Ultimate" DFS merely by replacing their DFS ROM. See below for this upgrade. (P.S. Watford's highly sophisticated DFS is fully compatible with Acorn DFS).

PRICES

- *Complete Disc Interface Kit incl. DFS ROM & fitting instructions* **£59**
- *Acorn's DFS Kit complete* **£59**
- *DFS Manual (Comprehensive)* *(no VAT)* **£6.95**
  (P.S. Our comprehensive DFS Manual covers both Acorn & Watford DFSs)
- *Watford's sophisticated DFS ROM only* **£16**
- *We will exchange your existing DFS ROM for Watford's Ultimate DFS ROM for only* **£12**
- *DNFS ROM only* **£16** ● *ADFS ROM only* **£25**
- *Watford's DFS is exclusively available from Watford Electronics. Every ROM carries a special label with our LOGO and serial number.*

WATFORD's DOUBLE DENSITY DFS INTERFACE

The DDFS from Watford Electronics represents a new standard in DFSs for the BBC micro. This is a double density version of our popular single density DFS, and combines all the features of this powerful DFS with the advantages of a system that gives 80% more storage per disc in double density mode. P.S. – Please note that not all DDFSs are capable of providing either the full 80% storage increase, or of allowing a file the full size of the disc – Ours allows both of these!

The typical piece of games software these days is provided upon a protected disc. In order to work on any double density system (including the others on the market) a protected piece of software needs to make calls through the OSWORD &7F routines. To ensure compatibility, the Watford DDFS features probably the most comprehensive and powerful 8271 emulation ever written for a double density system.

PRICES

- *Complete DDFS Kit incl. fitting instructions* **£58**
- *DDFS Manual* *(no VAT)* **£6.95**
- *We will exchange your existing Single Density DFS Kit for our DDFS Unit at* **£35**

Watford Electronics DDFS PLUS for the BBC B Plus

Watford Electronics was the first company to produce a serious alternative Disc Filing System (DFS) for the standard BBC micro. Since then, we have been refining and advancing this sophisticated product right up to today.

Now WE'VE DONE IT AGAIN; Watford proudly presents the Double Density Disc filing system for the BBC B+, with all the advantages of the advanced Watford DDFS available on the new BBC B+ DDFS.

Acting as a powerful alternative DFS to Acorn's '1770 DFS' supplied with the B3C+, this superb addition to any BBC+ greatly enhances it's performance with a simple fitting operation.

DDFS PLUS incorporates all the features of the Watford's popular DFS & DDFS for the BBC B, (at the same time retaining full compatibility with Acorn DFSs), plus it has the following extra features:

Automatic density selection – Full single and double density operations – Extremely powerful and comprehensive OSWORD &7F emulation – Any file can be full size of disc – Density of last access assumed for speed – Automatic 40/80 stepping swapped on error – All Acorn's extra disc commands implemented.

As you can see from the above information, Watford's DDFS for the BBC+ is far more sophisticated and well thought out than the standard. Take any disc produced by any Watford DFS from the standard BBC and catalogue straight off with no problems.

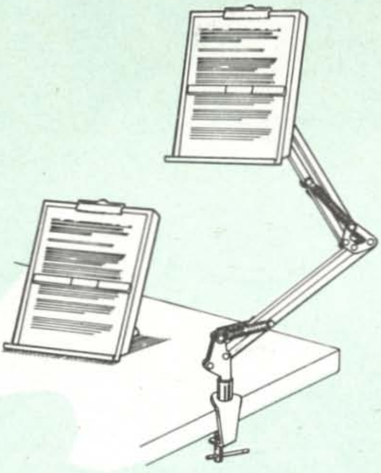
Unlike the Acorn 'ADFS', our DDFS+ system is just as easy to use as the standard DFSs, with no new complex concepts to have to learn. The features within our DFSs have been constantly enhanced over a period of three years during the time that they have been released; significant attention has been paid to feedback from our customers so that the features offered are carefully honed to the requirements of hobbyists and serious programmers alike.

The Watford DDFS+ is supplied with a comprehensive DDFS manual that explains the basics of disc drives, DFSs, etc. Priced at only £30 including the manual, the Watford DDFS+ is surely one of THE best buys you could make for your BBC B+!

Join the leaders in BBC peripherals; join Watford Electronics – committed to supporting the BBC micro.

DDFS PLUS **£30**
(Price includes comprehensive
manual)

COPY HOLDERS



How often have you been about to type hand written notes into your computer when you find that there's nowhere to rest the paper or that your notes are resting at the wrong angle to read the type? Whether the notes be your latest program or the draft of a new trilogy, the new Manuscript Holders from Watford are superb for holding your paper at the ideal height and angle to allow you read and type in ease and comfort.

Available in desk resting and shelf clamping versions, these two units hold your paper firmly by means of a magnetic ruler and a clip grip.

Mounting to a convenient flat surface, the two joint anglepoise Manuscript Holder allows the paper to be positioned at virtually any convenient angle whilst only taking up a fraction of the surface area that the paper being held does.

The smaller desk resting Manuscript Holder is useful for the more organised desk where the problem is simply holding the paper at the right angle.

Whatever desk arrangement you use, surely you deserve a Watford Manuscript Holder!

Amazing value at only
Desk Top **£9** (carr. £2)
Angle poise **£13** *(carr. £3)*

Quality Disc Drives from Watford Electronics

To help you decide which drive is the most suitable for your needs (and your pocket!), we have produced the table below.

The first capacity given in the first column indicates the single density capacity. The double density storage capacity is second one, (that within the brackets). All disc Drive type numbers start with the prefix "C".

The tinting on some of the boxes is used to indicate which Drives are 40 track and which are 80 track. The 40 track ones are manufactured by EPSON, the world famous Japanese company, (non-tinted boxes). The 80 track drives are famous MITSUBISHI drives (tinted boxes).

With two prices in a box (e.g. £295/£299), tne first price is for the standard drive and the second for the same unit in switchable type. Users of either of the two Watford DFSs will not need switchable drives as their DFS will provide software switching for them. Users of Acorn's DFS will find that they need to pay the extra for switchable drives if they wish to use 40 track discs in an 80 track drive.

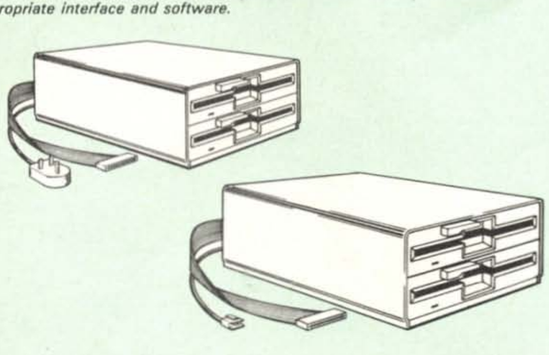
All our Drives are double sided. They are fast (3ms track to track, 15ms settle), quiet and have a low power consumption (average well under 1 amp). Extensive experience of the usage of disc drives suggests that the MITSUBISHI and EPSON drives currently represent about the best in terms of speed, reliability and overall "elegance" available for the BBC Micro. Various other "manufacturers" of disc drives for the BBC micro (more accurately, "packagers" label other manufacturers drives with their own name). We buy the high quality Epson and Mitsubishi drives in large quantities directly from the manufacturers, package them and sell them at "dealer" prices direct to the public.

Names you can trust, at prices you can afford!

If you look around the popular BBC micro press, you will find that the prices we quote for the top quality, new slimline disc drives are, virtually without exception, some of the best around. These prices, coupled with the backup of one of the country's largest distributors of BBC peripherals provides a superb deal.

Unless you anticipate using dual drives in a fully expanded BBC system for long periods of time with little ventilation, then we suggest that our range of "CL" disc drives without the PSU (Power Supply Unit) would be quite adequate: extensive tests within our workshops have confirmed this. All drives are supplied complete with a SPECIAL UTILITIES Disc, Cables and Plugs. The Drives with power supply have a mains moulded plug for safety purposes. (Ideal for Schools & Colleges. All single disc drives with power supply, (i.e. CS100, CS200 & CS400S) are supplied in a twin case with twin data cable for later inclusion of a second drive). At Watford we anticipate your needs of tomorrow not just today!

All disc drives advertised here will operate in double density mode with the appropriate interface and software.



Capacity	Drives without P.S.U.		Drives with P.S.U.	
	Single	Twin	Single	Twin
100K (180K)	CLS100 £76		CS100 £89	
200K (360K)	CLS 200 £76	CLD200 £140	CS 200 £89	CD200 £145
400K (720K)	CLS 400 £80 £83 CLS400S	CLD 400 £140	CS 400 £100 £103 CS 400S	CD400 £145
800K (1.44M)		CLD800 £162 £165 CLD 800S		CD 800 £179 £186 CD 800S

- TWIN Disc Drive Case, complete with Power Supply & Cables **£35**

Securicor carriage on Disc Drives £5

Prefix *C = Cased Drive*
L = Less PSU
S = Single
D = Double

Suffix *S = 40/80 Switchable*

e.g. *CLS400S = Cased drive, Less power supply unit, Single 400K, Switchable (40/80 track).*

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

£5.95 (Book No VAT)

3M – DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All our discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick disc labels and write protect tabs.

● *10 × 5¼" S/S D/D 40 Track Diskettes*	**£12**
● *10 × 5¼" D/S D/D 40 Track Diskettes*	**£15**
● *10 × 5¼" S/S D/D 80 Track Diskettes*	**£22**
● *10 × 5¼" D/S D/D 80 Track Diskettes*	**£22**
● *10 × 3½" S/S D/D 40/80 track Discs*	**£25**
● *10 × 3½" D/D D/D 40/80 track Discs*	**£35**

TOP QUALITY 5¼" DISKETTES

To complement the range of quality discs and disc drives that WE already sell, WE are now supplying some special offer packs of 10 high quality discs. Each Disc has a reinforced hub ring and carries a lifetime guarantee. These are supplied complete with selfstick labels and packaged in an attractive plastic library disc box to protect them from damage. We strongly recommend these Discs.

DON'T SETTLE FOR LESS, BUY THE BEST

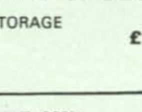
- *10 ×* **M4** *S-S D/D 40 Track Discs* **£11**
- *10 ×* **M5** *D/S D/D 40 Track Discs* **£14**
- *10 ×* **M7** *D/S D/D 80 Track Discs* **£19**
- *3" Double Sided Discs* **£5** *each*

DISC ALBUMS

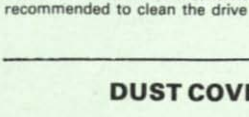
Attractively finished in Antique Brown, leather look vinyl. Stores upto 20 Discs. Each Disc can be seen through the clear view pockets. **£4**

LOCKABLE DISC STORAGE UNITS

Strong plastic case that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.



M35 - holds upto 40 discs	**£9**
M85 – holds upto 95 discs	**£12**



PLASTIC LIBRARY CASES

FOR 5¼" DISC STORAGE holds 10 Discs. **£1.80**

FLOPPY HEAD CLEANER KIT

The heads in floppy drives are precision made and very sensitive to dirt. The use of a cleaner Kit is a sensible precaution against losing valuable data. It is recommended to clean the drive head once a week. It is very simple to use.

£8

DUST COVERS (For our Disc Drives)

Single (without PSU) **£3.20**	Twin (without PSU) **£3.85**
Single (with PSU) **£3.95**	Twin (with PSU) **£3.90**

Continued →

EPSON NLQ ROM
for the BBC Micro

Harness the full potentials of your Epson RX & FX Printers. Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100.

Look at the features:
- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is supplied complete with comprehensive manual.

P.S. NLQ ROM is compatible with the Torch Z80 system and can be used from within the Perfect Writer software.

Only: £25

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

THE NLQ DESIGNER

KAGA KP819/910 and Canon PW1080 are two superb printers, as our many thousands of satisfied customers would surely attest to. One of it's particularly strong points is the NLQ option that it offers; perhaps one of the more weaker points is the effort required to design your own custom NLQ font.

Well the solution is here NOW in the shape of Watford's NLQ DESIGNER ROM! This powerful piece of software allows easy design and entry of a full NLQ font, with further fonts recallable from disc. Once a font has been programmed with the versatile NLQ DESIGNER, it can be saved to disc, downloaded to your Kaga (or Canon) printer, or even programmed into an EPROM (given the appropriate hardware) and then plugged directly into your printer so that it is available immediately when you turn it on. Downloadable Fonts require 6264 RAM chip fitted.

A 40/80 track format disc containing 3 example fonts is included in the package.

(P.S. This ROM is not suitable for Epson printers as they don't normally have NLQ ability. Keep reading our adverts though – work is in development!)

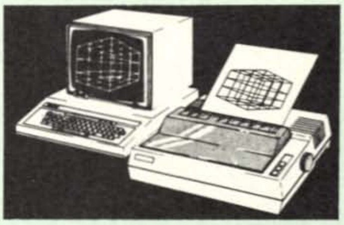
- NLQ Designer ROM & FONT Disc **£25**
- Kaga Individual FONT ROMs **£15**

Now available:

- Centronics GLP Printer NLQ Designer ROM **£20**
- GLP Individual FONT ROMs **£14**

(Write in for further details on both).

DUMPOUT 3



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!
The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.
Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any graphics mode, plus modes 7 and '8'. There are many optional parameters but you need only specify the parameters you wish to change.

Features available include:

- Vertical and horizontal scaling through all the graphic modes and mode 7
- Rotation of the image produced through 90, 180 and 270 degrees
- Left hand indentation setting
- Screen dump window definition
- Colour grey scaling
- Two tone fast dump
- Special colour mask
- Mode 7 contrast expansion
- Mode 7 contiguous dump
- Key triggered dumps
- User port switched dumps

What does the independent press say!

Practical Electronics, May 1985
"The Dump Out 3 ROM from Watford Electronics represents one of the most sophisticated types of printer dump utilities available for the BBC Micro . . .".

"an extremely sophisticated and powerful dump utility".

"VERDICT – Dump Out 3 ROM has all the facilities which you are ever likely to need for producing printer dumps. The facilities available work extremely well and if printer dumps are something which you require, then this ROM can be recommended to help you to get the best out of your dot matrix printer".

The Micro User Feb. 1985.
"Well, here is that winner"!

"provide(s) some rather sophisticated screen dumps. Producing high resolution paper copies of graphic screens in any (graphics) mode will be the major reason for buying this ROM, and this is where Dump Out 3 performs PAR EXCELLENCE". (Our capitals for their italics.)

"The versatility of *GIMAGE (the graphics dump command) when using these parameters is amazing. Pictures of almost any size, shape, contrast or distortion may be produced without the need for a reducing photocopier or trick photography".

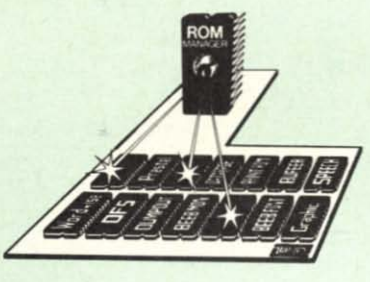
"Without reservation I wholeheartedly recommend the Dump Out 3 ROM as the ultimate screen dump facility for the BBC micro. It is easy to use yet highly versatile, and caters for all BBC screen modes in multitone high resolution printing. Whole, partial, rotated and scaled screens may be dumped to almost any BBC compatible dot matrix printer (see our list at the end of this advert). At £24 it must represent excellent value for money and surely cannot be beaten".

Designed for use with the following printers:

CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/200/400, Mannesman Tally etc.
Price including comprehensive manual

£25

ROM MANAGER



Probably the most powerful way of expanding the BBC micro is from the use of Sideways ROMs. One problem faced by the avid ROM collector is that of ROM command clashes. The solution is very simple in the form of the ROM that "Provides comprehensive management of all your installed ROMs". (Quote from BEEBUG November '84.)

Basically, ROM Manager offers you the ability to turn off any installed ROM, or to send any * command to any specific installed ROM. It is said that imitation is the sincerest form of flattery – Acorn's BBC Plus features many of the abilities of this powerful ROM.

Many more facilities available.

Price **SPECIAL OFFER £18**

BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software. It allows you to display text on the screen in 13 different styles. It is supplied complete with a Spooler and Editor on 40 or 80 track disc.
(Please write in for technical details).

ONLY **£25**

BEEB PRINTER ROM

"Makes Printing Childs Play"

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.

★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.

★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.

★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.

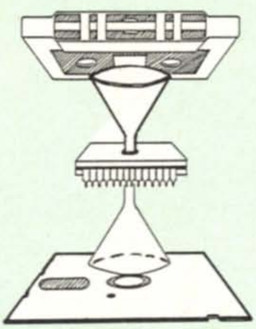
★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.

★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

TRANSFEROM

(Tape to Disc Utility)



The only TAPE to DISC Utility ROM that works with our Double Density Disc Interface.

After months of top secret development, we are now able to supply details of this advanced and sophisticated utility ROM for the BBC micro. Just look at the features:

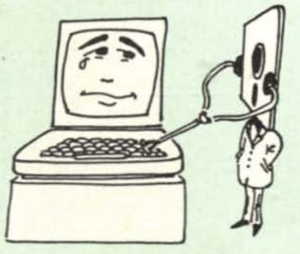
- Fully menu driven for ease of use
- Copes with locked programs
- A very comprehensive built in copying features
- Copies very long adventure games
- Supplied with comprehensive manual

TRANSFEROM is now available in BOTH single and double density versions. The single density version works with both the Acorn and Watford single density DFSs. The double density version works with the Watford DDFS system only.

TRANSFEROM takes your software on tape and saves them onto disc. TRANSFEROM does not stop when one disc is full; you just insert another disc in and carry on with that one! Surely this is the most valuable investment you could make if you have tape software that you wish to transfer to disc! Please specify version required – Single or Double Density.

£25.00

DIAGNOSTICS DISC



The BBC micro is a very complex machine and thus diagnosing a fault can be very difficult. Until now, the only way to discover the nature of a fault was either to find a competent friend with a large degree of patience or to find your nearest dealer and pay him to find out what is wrong.

At Watford Electronics, we realise how difficult it can be when faced with a problem, finding yourself a long way from your nearest dealer, or even just uncertain about your Beeb's health, but not wanting to waste time and money taking it to be looked at.

The solution to these problems is here now, in the form of the Watford's Diagnostics Disc. This excellent utility is specially designed to test out the following areas of your Beeb:

RAMs, ROMs, ULAs, Sound, Keyboard, Disc, RS423, ADC, User Port, Printer Port, Cassette, Joysticks, Speech, Disc Drives, 6502 and Z80 2nd Processors.

Continued

This utility is an invaluable aid for all those who take the reliability of their system seriously. A comprehensive manual provides full operating details and a list of possible causes and remedies for any faults that you may find along the way. The package also enables a permanent equipment and service record to be maintained.

Only £20.00

ROMAS

THE CROSS ASSEMBLER AND MACRO EDITOR FOR SERIOUS PROGRAMMERS!

ND
6502
HEX
REM
ASM
CHR$
FAL
LD
Z80

ROMAS is a carefully designed, sophisticated yet simple to use, development system for serious assembly language programmers. Using the BBC as the development system, you can choose your target system from the following processors:

6502, 65C02, Z80, 8085, 8041, 6809 and Z8 P.S. This includes the Acorn 6502 & Z80.

ROMAS features a powerful expression analyser, making complex table easy to generate. To aid in documentation, fully formatted assembly listings may be produced, with full symbol table output at the end.

ROMAS is provided with a powerful cross referancer to produce a listing of all the labels in a given "source" program; this makes it easy to check to see if you are about to duplicate a label.

The Macro Editor

Features of this powerful editor provided with the ROMAS package include:

- Works in all 40 and 80 column screen modes
- Fast load and save speeds
- Continuous line and column number displays
- Search, replace and move; all available in macros
- Command repetition

The ROMAS package includes a comprehensive manual, providing detailed documentation and plenty of examples.

A give away at . . . **Only £45**

Please specify 40 or 80 track disc when ordering.

ADE

'Systems' complete program development package in a 16K ROM. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£43**

ULTRACALC 2

The mark 2 version of the BBC Publications' extremely popular electronic spreadsheet ROM.

Only: **£66**

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

ROM-SPELL

"way ahead of any competition"

ROMSPELL
ENGLISH DICTIONARY

ROM-SPELL is probably THE most advanced and fastest spelling checker available for the BBC Micro. Printed below are some extracts from a recent independent review (A&B Computing Nov. '85), which we feel sure will convince you that this is THE only spelling checker worth considering.

"The editing system is very neat and simple, instead of replying to queries and beeps all of the time . . ."

"The other feature which places ROM-SPELL way in front of any competition is the ability to examine the user dictionary, so any spelling mistakes that have found themselves on the disc can be examined and taken out if necessary".

". . . that it is compatible with many of the popular word processors on the market is a good indication that ROM-SPELL is going to be a very popular product indeed".

". . . ROM-SPELL is by far the best spelling checker for the unexpanded BBC B (with or without word processor). It boasts features which are hard to find on conventional spellcheckers on CP/M and MSDOS, namely Spellstar and has a speed/performance ratio of roughly the same as its CP/M cousin. The difference is that the CP/M version would cost the best part of £500".

". . . and with such vital house keeping features as an ambiguous word checker, the ability to edit the user dictionary, a comprehensive manual that is both easy to read and actually ENJOYABLE to learn from, . . . I feel confident that ROM-SPELL will woo the word processing public with no problems at all".

Don't settle for less, Buy the best.

ROM-SPELL costs only **£25**

(Please state 40 or 80 track disc)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10** (40 or 80 track)

BEEBMON

BEEBMON is the most powerful and versatile machine code monitor from Watford Electronics. BEEBMON offers some superb features specially designed to make the task of understanding and debugging machine code easier; indeed BEEBMON is probably the only product with sufficient power to aid in the debugging of such complex pieces of software as a DFS.

Offering a total emulation mode, BEEBMON can be used to single step through code anywhere in memory. All breakpoints are emulated and the workspace is totally relocatable, allowing for the simulation of all those "awkward" pieces of code.

(Write in for technical details.)

£24

DISASSEMBLER ROM

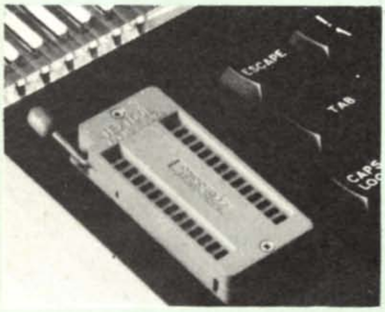
Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.

Please write in for technical details.

ONLY **£16**

Continued →

SIDEWAYS ZIF SOCKET



Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING required. The ZIF (Zero Insertion Force) eliminates the possibility of damage to your ROM pins when inserting & extracting.

- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.

- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.

- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£15**

16K Sideways RAM Modules

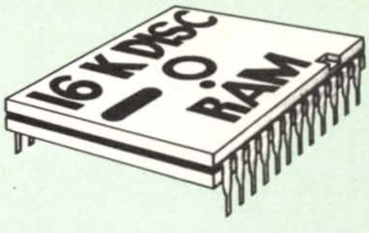
This is it! The revolutionary design RAM Module you've been waiting for. Complete with such features as read and write protection, these new modules from Watford Electronics are ideal for the hobbyist, software developer and ROM collector.
Key points to note about this new addition to the Watford range of products are:

- Write protection (useful in a variety of circumstances).
- Read protection (allows recovery from ROM crashes).
- Compact construction.
- May be fitted in systems even with a ROM board.
- Multiple units may be fitted, even with a ROM board.
- No overheating or overloading problems.
- Free utilities disc supplied.
- Can be used as a 16K PRINTER BUFFER.
- Works with any ROM.
- Ideal for professional software development.
- Supplied with utilities software disc.

Introductory offer: **£29**

Optional extras

READ and WRITE protect Switches	£2
BATTERY BACKUP	**£3**



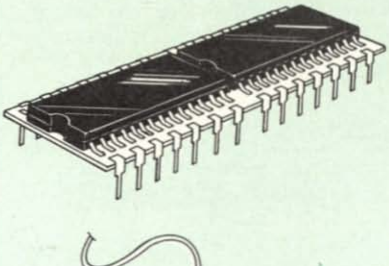
This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

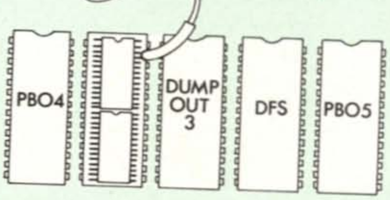
- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM in conjunction with our Buffer & Backup ROM.

New Low Price: £30

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

SOLID STATE 16K SIDEWAYS RAM



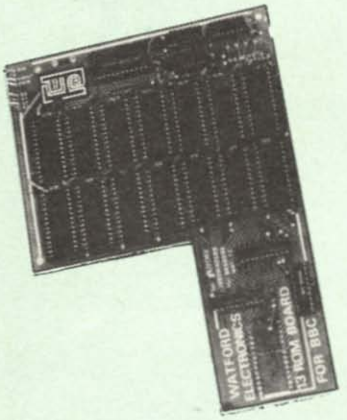


This new unit from Watford, which utilises the latest in Static RAM technology, offers 16k of easy-fit sideways RAM in a very compact unit with a footprint no larger than a standard 28pin EPROM. With only a single flying lead to fit, this compact unit works with any BBC Micro with or without a ROM board. Compatible with BBC B Plus. Like our other 16K RAM Modules, this unit is very simple to fit.

Only **£28**

Supplied complete with comprehensive software on Disc, Operating and fitting instructions.

Mk-3 13 ROM SOCKET EXPANSION BOARD



- Increase BBCs capacity for ROMs from 4 to 16.
- Easy installation; simply plug in with only 5 wires to solder.
- Minimal space needed.
- Compatible with our DDFS, RAM Card, Torch card, 2nd Processors, etc.
- Advanced low power chips keeps power consumption to a minimum.
- Very versatile Socket 14 can take 2716, 2732, 2764, 27128, 6116 and 6264 chips.
- *LOADs or writes in the region &8000 to &BFFF are automatically directed at the RAM.
- Auto-write protect line makes RAM look like ROM.
- READ protect line which makes socket 14 "vanish" – useful to get out of software crashes.
- On-board battery back-up option with a high speed charging circuit.
- Supplied ready-built and tested, complete with fitting instructions.

Price: Still Only £30
Ni-cad 'PCB' Battery £3

SOLDERLESS SIDEWAYS ROM SOCKET BOARD

This brand new board from Watford Electronics is designed specifically for those wishing to add a ROM board to their own BBC without the need to perform any soldering.

This new board expands the total possible number of ROMs in a BBC from 4 to 16. Also permissable, are various configurations of RAM (up to 16k) and different sized EPROMs (see below).

Unlike our competitors inferior boards, the ONLY upgrade required for fitting battery backup to the Watford Solderless ROM board (all Watford ROM boards, actually) is the fitting of the battery itself. (No other expensive components are required.)

- The key features of this new, no fuss, easy to install quality product from BBC leaders Watford Electronics are as follows:
- Increase your BBCs capacity for ROMs from 4 to 16.
- **No soldering required.**
- Very low power consumption.
- Minimal space required.
- Compatible with Torch, DDFS, RAM Card, 2nd Processor, etc.
- Socket 14 can take the following chips: 2716, 2732, 2764, 27128, 6116, 6264.
- Auto write protect for RAM chips.
- Read protect to make RAM "Vanish"; allows recovery from ROM crashes.
- Battery backup option for RAM chips.
- Supplied ready to fit with comprehensive instructions.

Price: Only £32
Battery backup fitted **£35**

Watford ROM/RAM CARD

A must for all serious users

Watford Electronics announced the first ever commercial ROM board for the BBC micro, the Watford Electronics 13 ROM Socket Board 3 years ago. Following the success of this board, we have designed what probably represents the ultimate in expansion boards, the new Watford Electronics ROM/RAM board. This highly versatile and sophisticated board represents the latest in "2nd generation" sideways ROM technology for the BBC micro, designed to satisfy the serious BBC user.

- NO SOLDERING required to fit the board.
- NO overheating problems.
- No User Port corruption (avoids problems with the mouse, modems, Eprom Programmers, etc.)
- Fully buffered for peace of mind.
- Firm mounting in BBC micro.
- Compatible with ALL BBC micros (not BBC Plus).
- Total number of ROMs increased from 4 to 8.
- Up to 8 banks of sideways RAM (dynamic).
- Option for 16k of Battery backed CMOS RAM (CMOS RAM needs one ROM socket).
- Write protect for ALL RAM.
- Master write protect for all sockets.
- Read protect for CMOS RAM (ALLEVIATES crashes during ROM development).
- Separate RAM write register (&FF30 to &FF3F).
- Automatic write to currently selected RAM socket for convenience.
- Can run ANY BBC ROM.
- FREE utilities disc packed with software.
- Compatible with our DDFS board, 32k RAM Card, Delta Card, sideways ZIF, etc.
- Large printer buffer.
- UNIQUE Fully implemented RAM FILING SYSTEM (similar to the popular Watford DFS).
- ROM to RAM load and save facilities.

The SFS (Silicon Filing System) can utilise up to the full 128k of RAM (with the SFS in any paged RAM) as a SILICON DISC. This behaves as a disc drive, with all the normal Watford DFS features (including OSWORD &7F for ROM-SPELL, etc.) to provide an environment that looks like a disc but loads and saves MUCH faster.

The ROM/RAM Board plugs into the 6502 CPU socket. This leaves free all the existing ROM sockets, which can still be used normally.

Any ROM that can be plugged into the BBC micro's own ROM sockets may be used in the ROM/RAM Board.

The ROM/RAM Board is supplied with all ordered options fitted as standard. Upgrade kits (with full instructions) are available for all of the options, should the user wish to upgrade in the future. Please write in for further details.

INTRODUCTORY PRICES:

● *ROM/RAM card with 32k dynamic RAM*	***£45***
● *ROM/RAM card with 64k dynamic RAM*	***£69***
● *ROM/RAM card with a massive 128k dynamic RAM*	***£109***

OPTIONAL EXTRAS:

● *16k plug-in Static RAM kit*	***£9***
● *Battery backup*	***£2***
● *Read and Write protect switches*	***£2***
Complete ROM/RAM board (all options installed)	***£125***

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£51** (£3 carr)

Le Modem

The MODEM from Watford

At last a professional MODEM for the BBC Micro. Unlike other 'Modem packages' this is a complete package there are no extra software costs to get 'up and running'. Of course Le MODEM is multi-standard, i.e. 300/300, 1200/75 UK and BELL (USA) are all supported.

The features that make Le MODEM such good value are:

- *A complete communications terminal that transforms your BBC Micro into a very powerful World/wide data transfer system.*
- *Auto Dials, Auto Answers, Auto Baud selects and is completely controlled by your Micro. There are no external controls!*
- *Allows you to access PRESTEL, B.T. GOLD, THE SOURCE, MICROLINK, MICRONET, MICROWEB, THE TIMES NETWORK, MICRO LIVE (BBC TV database), CITY BB and more.*
- *Designed to be SIMPLE but SOPHISTICATED. To LOGON to a data base all you have to know is its TELEPHONE NUMBER, Le MODEM does the rest.*
- *Supplied with a comprehensive telecomms package in a 16K sideways ROM which includes a FULL PRESTEL terminal allowing TELESOFTWARE to be downloaded.*
- *A comprehensive 80 column terminal. This includes XMODEM error checked transfer protocol, to allow error free data transfer anywhere in the world!*
- *FULLY controlled by simple "*COMMANDS allowing you to control it from your own BASIC programs. To get you started we supply a FREE disc of bundled software!*
- *Connects to the 1MHz bus. A *AUDIO ON/OFF command allows you to actually hear the telephone line through your BBC micro loudspeaker.*
- *Completely self contained with internal mains power supply. (Even a free mains plug is fitted!) A *TEST facility gives ON SCREEN indication that Le MODEM is working correctly.*
- *Packaged in such as way that you need nothing else except a BBC Micro to communicate with computers all over the world.*
- *BT Approval applied for.*

Price: **£89** (carr £3)

(Price includes Software ROM, Cables and Manual)

Nightingale Modem

SPECIAL PRICE to our Customers

£119

(Price includes COMMSTAR ROM & comprehensive manuals)

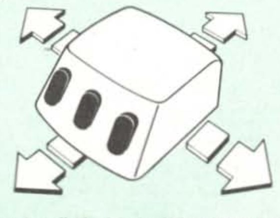
Nightingale Modem without software	**Only £99**
COMMSTAR ROM package only (P&P on modem £2.00)	**£29**
Auto Dial/Auto Answer Board	**£48**
Auto Dial Utilities Disc	**£9.50**
OBBS Bulletin Software	**£20.00**

GIFT VOUCHERS

Following numerous requests from you the customers, we have at last introduced our GIFT VOUCHER service. The Vouchers are available in £5; £10 & £20 denominations and are an ideal answer when faced with that problem of what to give for that special Birthday/Christmasgift. Simply send your credit card number or your cheque for the amount of Vouchers you require and we shall send you these attractive Vouchers. (There is a 50p handling charge on any amount.)

THE AMX MOUSE

The AMX Mouse needs no introduction. It is simply the best.



Now supplied with the NEW SUPERART Software ROM & Disc at no extra cost.

ONLY: £66.95

We are giving away the sophisticated **COLOUR ART** Software package **ABSOLUTELY FREE** with every purchase of the AMX Mouse from us.

AMX DESK Package	**£19.00**
AMX UTILITY Package	**£11.50**
AMX SUPERART Package	**£43**
AMX PAGE-MAKER Pack	**£43**
AMX 3D ZICON Disc	**£21**
AMX Database Disc	**£21**
AMX XAM Educational	**£21**

COLOUR ART

This novel program allows you to add COLOUR to any drawing produced with your AMX Mouse package, and really brings those pictures alive. Not with just any colours, mind you, but a full range from up to 255 different shades! It's simplicity itself to use this "painting by numbers" painter to create simple, striking and powerful images to please the eye.

Price **£10**

(please specify 40 or 80 track disc when ordering)

Versatile **BEEB SPEECH SYNTHESISER** Unit

Beeb Speech Synthesiser

The Watford Speech Synthesiser is a very flexible speech synthesis unit based upon the powerful phonemes system. This system stores the building blocks of speech (called phonemes) and allows you to combine them quickly and easily to form virtually any word imaginable.

Supplied with an advanced ROM, you are provided with a 500 word dictionary to get you started. This can easily be added to by following the notes given in the comprehensive manual.

SPECIAL PRICE £32

LOGOTRON LOGO

The popular Logotron Logo in ROM. Recommended by most Education authorities.

Only: £55

Continued →

COMPUTER CONCEPT'S ROMS

ACCELERATOR	**£52**
CARETAKER Basic Utility	**£27**
Graphics ROM	**£26**
Disc Doctor ROM	**£26**
TERMI	**£27**
COMMUNICATOR	**£58**
SPEECH ROM	**£26**

Wordwise

The most popular Wordprocessor for the BBC Micro.

Special Offer: **£32**

Wordwise plus

£45

FREE FREE FREE

This month we are giving away absolutely FREE, the superb Word-Aid ROM worth £20, with every WORDWISE PLUS package bought from us.

Word-Aid

The most comprehensive utilities ROM for Wordwise-Plus

Extend the power of your Wordwise Plus word processor with this most advanced ROM from Watford. By utilising the powerful Wordwise Plus programming language, WordAid provides a whole host of extra features, all accessed via a special new menu option. This ROM has been personally approved by Mr Charles Moir, the author of WORDWISE PLUS.

- Alphabetical sorting of names and addresses.
- Text transfer options.
- Chapter marker.
- Epson printer codes function key option.
- Search and display in preview mode.
- Embedded command removal.
- Print Multiple copies of a document.
- Multiple file options for print and preview.
- Address finder.
- Label printer.
- Mail-merger.
- Number/delete/renumber.
- Clear text/segment area.

Only **£20**

(N.B. Word Aid requires a Disc Interface in your Micro)

HI-WORDWISE-PLUS

Supplied on disc. This version requires a WORDWISE-PLUS ROM to be present in the machine. It gives up to 44k of text space on the 6502 2nd processor.

£5

Inter SHEET

The most powerful spreadsheet package available for the BBC Micro. Ultra-fast replication and calculation times help make this the easiest to use. It has received very favourable reviews. Unique 105 column screen mode. Supplied in 2 ROMs.

£45

INTER CHART

This unique program is the only one of its sort on the market. Accepts data from a variety of sources and plots line graphs, bar charts or pie charts. Up to 16 separate charts may be stored in memory. Built in screen dump for EPSON compatible printers, but can use other printer dump routines.

ONLY: £30

These ROMs form part of the first and only truly integrated range of programs for the BBC. Up to 16 sets of data can be stored in memory at once and data can be transferred directly and simply between programs, e.g. from sheet to sheet, or sheet to chart, or word processor to sheet etc., etc.

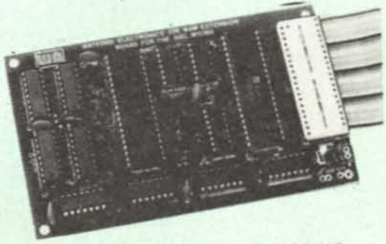
INTER-WORD and INTER-BASE will follow shortly to complete this suite of programs.

P.S. The Watford 32k shadow RAM board is an ideal complement to these programs, allowing them to operate in the 80 column screen modes with NO reduction in memory.

32K

SHADOW RAM-Printer Buffer

Expansion Board



A MUST FOR WORD PROCESSING

Watford Electronics now brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. Just plug the ribbon cable into the 6502 processor socket, and fit the compact board inside the computer. Immediately you will gain not 16K or even 20K, but a massive 32K of extra RAM!!!

- IMPROVE your WORD PROCESSING system, whether disc or cassette based. Don't wait for a slow printer – type in text while printing. TWO JOBS DONE SIMULTANEOUSLY and £100+ saved on a printer buffer.

- "VIEW" Wordprocessor users can now type in text in 80 columns and have up to 28,000 bytes free – 5 times as much as normal.

- In WORDWISE (or WORDWISE-PLUS), preview in 80 columns with the full 24K of text in memory. This superb product is recommended by Computer Concepts for use with both Wordwise and Wordwise Plus. We wholeheartedly agree with this commendation.

- Combine GOOD GRAPHICS and LONG PROGRAMS. Use the top 20K of the expansion RAM as the screen display memory, leaving all the standard BBC RAM free for programs. Benefit from MODE 0/1/2 graphics and 28K of program space.

- Use the FULL 32K or the bottom 12K of the expansion RAM as a PRINTER buffer for PARALLEL or SERIAL printers, sound channels, RS423 etc. Only 12K Buffer can be used in Wordwise or Wordwise+ because of the way these softwares are written. Print large text files while running long graphics programs and have all your buffer options available as well (*FX15,21,138,145,ADVAL etc). Only 12K Buffer can be used in Wordwise or Wordwise + because of the way these softwares are written.

- Ensure COMPATIBILITY with a vast range of hardware (including Watford & ATPL ROM boards, double density boards, second processors), and software (including BASIC, TOOLKIT, VIEW, WORDWISE (1.20+), WORDWISE-PLUS). This is because our board, unlike those of our competitors, is connected to the computer by a ribbon cable.

- Achieve EASY OPERATION with ROM based software. A large range of commands is available for machine code and BASIC users, including some useful *HELP messages.

Only: £59

(Price includes a comprehensive manual and the ROM)

VIEW

VIEW WORDPROCESSOR 2.1 .... **£46**

VIEW 3.0 ROM

This latest version features automatic relocation with a 6502 second processor and takes full advantage of any shadow memory fitted. BBC B Plus compatible. Supplied complete with Printer Driver Generator tape.

Price: Only **£60**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft)	**£49**
VIEWSTORE	**£49**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

Only £10

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £10

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

Only: £10

INCREDIBLE WORD PROCESSING DEAL ! ! !

Watford Electronics, already renowned for quality products at discount prices, are offering, for a limited period only, the truly spectacular BARGAIN OF THE YEAR!

A Watford's 32K RAM Card (offering printer buffering and shadow screen RAM facilities) with the well known WORDWISE PLUS Word processor.

The Watford 32K RAM Card was the first 32K shadow RAM expansion card for the BBC micro and offers some genuinely useful facilities to the word processing prodigy.

32K Shadow RAM Card/Printer Buffer and Wordwise Plus (a very powerful package) for the absolutely astounding price of:

Only £69

(P.S. For an extra £14, we will include Word-Aid ROM package for the Wordwise Plus, if bought at the same time.)

ISLAND LOGIC MUSIC SYSTEM £25

Viglen Console Unit

Enhance the appearance and convenience of your BBC Micro with the Viglen console unit.

£42

BOOKS (No VAT on Books)

21 Games for the BBC Micro	£5.95
30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
40 Educational Games for the BBC Micro	£5.95
6502 Assembly Language Program	£13.95
6502 Application	£11.95
6502 Assembly Language Subroutines	£19.95
6502 Machine code for Humans	£7.95
68000 Assembly Lang. Programming	£19
A young persons guide to BBC Basic	£4.50
Advanced Disc User Guide	£9.95
Advanced ROM User Guide	£14.95
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
Applied Assembly Lang. for BBC	£7.95
Assembler Routines for the 6502	£**XXX**
Assembly Language Programming FOR the BBC Micro	£8.95
Assembly Programming made Easy	£5.95
Basic ROM User Guide	£9.95
Basic User Guide for BBC Micro	£10.00
BBC BASIC for Beginners	£7.95
BBC BASIC	£5.95
BBC Forth	£7.50
BBC Hardware Projects	£8.95
BBC Machine Code Portfolio	£7.95
BBC Micro [illegible] on guide	£5.95
BBC Micro A[illegible]pert Guide	£6.95
BBC Micro Assembly Language	£7.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Graphics and Sound	£6.95
BBC Micro ROM Book	£9.95
BBC Micro **ROM PAGING** System Explained	£2.00
BBC Micro Disc Companion	£7.95
BBC User Guide	£10.00
BBC Wargaming	£8.95
Basic Programming on BBC Micro	£5.95
BCPL User Guide	£15
Brain teasers for BBC micro	£5.95
Business Applications on BBC	£7.95
Computing for All the Family	£6.45
CP/M Bible	£16.00
CP/M Handbook with MPM	£13.95
CP/M Soul of	£14.95
CP/M The software BUS	£8.95
Creating Adventure Programs on the BBC Micro	£4.95
Creative Animation & Graphics	£7.95
Creative graphics on BBC Micro	£7.50
DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Disc Programming Techniques	£7.95
Discovering BBC Micro Machine Code	£6.95
Discover FORTH	£13.95
Easy Programming for the BBC Micro	£5.95
Electron Machine Code for Beginners	£6.95
Exploiting BBC Basic	£6.95
Exploring FORTH	£6.95
Filing System & Databases for the BBC Micro	£7.95
Further Prog. for BBC Micro	£5.95
FORTH on the BBC Micro	£7.95
Forth Programming	£14.40
Functional Forth for the BBC Micro	£5.95
Games BBC Computer Play	£6.95
Getting more from your BBC & Electron	£6.95
Graphics for Children	£7.95
Graphs & Charts on BBC Micro	£7.50
Graphic Art for BBC Computer	£5.95
Hackers Handbook	£4.95
Handbook of Procedure & Functions for the BBC Micro	£6.95
Introducing CP/M on the BBC Micro Z80 2nd Processor	£9.95
Interfacing Projects for the BBC	£6.95
Introducing the BBC Micro	£5.95
Introducing LOGO	£5.95
Introduction to FORTH	£8.95
Introduction to PASCAL	£16.50
Let your BBC teach u to program	£6.45
LISP	£9.25
LISP, A Beginners Guide to	£10.95
LISP Cassette	£15.50
Logo Programming	£8.95
Mysteries of DISC DRIVES and DFS REVEALED	**£5.95**
Mastering CP/M	£16.50
Micronet Handbook	£6.95
Practical Programs for the BBC Micro	£6.95
Programming the 6502	£13.95
Programming the BBC micro	£6.95
Programming the Z80	£16.95
Programming with Graphics	£5.95
Sensing & Control Projects for the BBC Micro	£5.95
Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
The Complete Programmer	£5.95
The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Using Floppy Discs with BBC Micro	£5.95
Viewsheet User Guide	£3.50
Using BBC Basic	£6.95
Wordstar & CP/M made easy	£7.45

BEEB VIDEO DIGITISER

Using any source of composite video (colour or monochrome) and the Watford Beeb Video Digitiser, you can convert an image from your camera into a graphics screen on the BBC Micro.

This uses the full graphics capacity of the BBC micro in modes 0, 1 or 2. The video source may be a camera, video recorder or television, and is connected via the video output socket.

Images produced can be compressed, stored to disc, printed on an Epson compatible printer, directly used to generate graphics, analysed for scientific and educational use or converted to other formats e.g. Slow Scan TV or receiving a picture from a remote camera using a modem.

The output from the digitiser exactly matches the graphics capability in each mode, with up to 8 levels of grey in mode 2. The unit connects into the User Port and automatically scans a complete picture in 1.6 seconds.

Both the black and white levels can be adjusted manually for the optimum picture, or switched to automatic for unattended use. The image produced can be reversed if necessary.

Full controlling software is supplied on a normal sideways ROM and this is easily accessed via additional * commands. The package is designed to allow easy input of complex screens and give full access of the data to the user. Once on the screen, the image can be used as a normal graphics screen, allowing any of the usual graphics commands in BASIC or other ROM's to work on it.

A special print dump routine is included with the driver programs. This is specially designed to produce a fast, correctly proportioned picture, with reduced "contouring", resulting in an accurate reproduction of the original image.

Features offered by this package include:

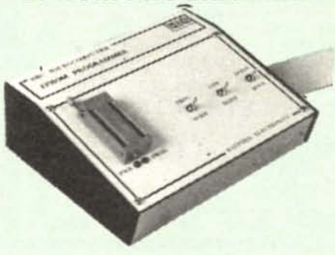
- The adding of pictures or written text to typed documents.
- Unattended recording of scientific data.
- Entry of real images into graphics programs.
- Generation of computer images.
- Slow scan television; sending images via a modem or radio.
- Security.
- Input from any video 1v video source.
- Full resolution in Modes 0,1 or 2.
- 1.6 seconds scan time.
- Up to 8 grey levels
- Manual or Auto level control
- Connects to user port

Detailed examples of driving this unit from BASIC or other languages are all provided in the extensive manual supplied.

£95 (Carr. £3)

(Price includes: Digitiser Unit, ROM & a comprehensive Manual.)

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:

Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.

Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69

(£3 carr.)

LOW COST 'DIN' EPROM PROGRAMMER

A high performance, low cost, self contained 'DIN' EPROM PROGRAMMER for the BBC Micro. Plugs into the BBC Micro's user port.

The features are:

- Will program 2716, 2732, 2532, 2764 & 27128 EPROMs.
- Copy Eprom into memory and compute checksum.
- Blank check EPROM.
- Program EPROM from memory
- Verify programmed EPROM and display checksum.
- All * commands may be used from menu mode.
- High speed programming on 2764 & 27128.
- Machine code SOFTWARE supplied in ROM.

Only: **£49.50** (carr. £2)

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

ERASER EB – Standard version erases up to 16 chips.	**£28**
ERASER GT – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened.	**£30**
Spare UV tubes.	**£9**

Continued ⟶

VOLTMACE JOYSTICKS

Delta 3B Single Joystick	£10
Delta 3B Twin Joysticks	£16
Delta 14B Single Joystick	£12
Delta 14B/1 Adaptor Module	£12
Transfer Software Disc/Tape	£7

ROM EXTRACTION TOOL

This extremely useful tool allows you trouble free chip removal from your computer by distributing the removal force over the whole body of any 24 or 28 pin chip.

Price: **£2**

Acorn's GRAPHICS ROM
£25

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. A must for every computer user.

Protection for only **£9.50**

Replacement FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

£4

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£13** (£2 carr.)

DATA RECORDER

Top quality slimline portable cassette recorder designed specifically for use with home computers. Mains/Battery operated with tape counter.

£20

DATA CABLE to connect recorder to BBC **£2.00**

DATA CASSETTES

Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20.**

CONNECTING LEADS

(All ready made and tested)

CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	£2.00
to 3 pin DIN Plug + 1 Jack Plug	£2.00
to 7 pin DIN Plug	£2.50
to 3 Jack Plugs	£2.00
6 pin DIN to 6 pin DIN Plug (RGB)	£2.50

DISC DRIVE POWER LEADS

Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

DISC DRIVE INTERFACE LEADS
BBC to Disc Drives Ribbon Cable
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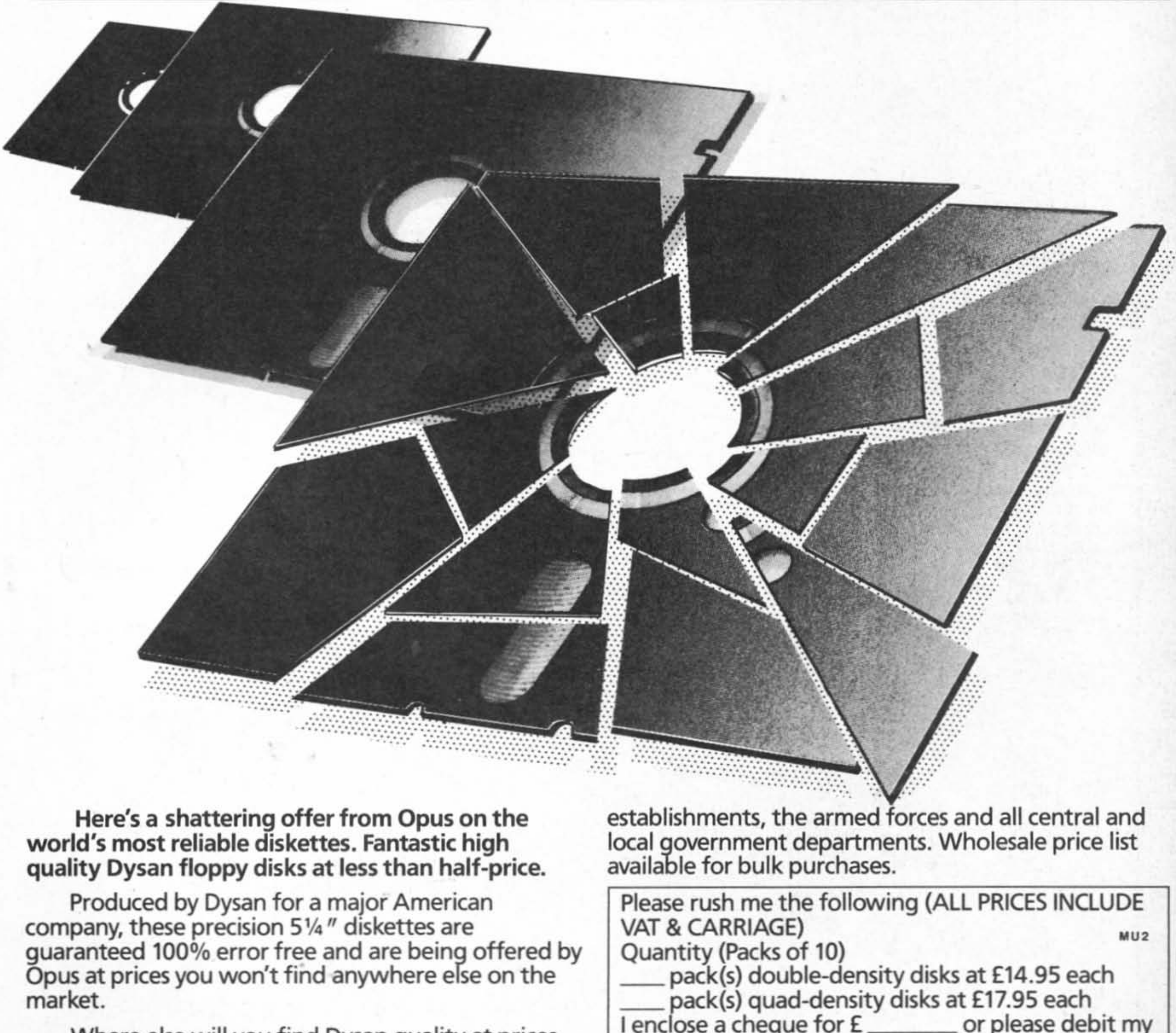

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ProWord
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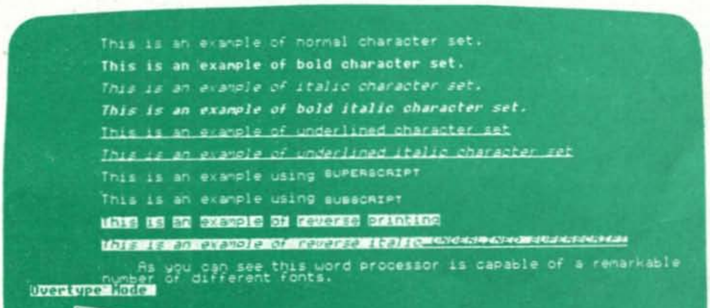
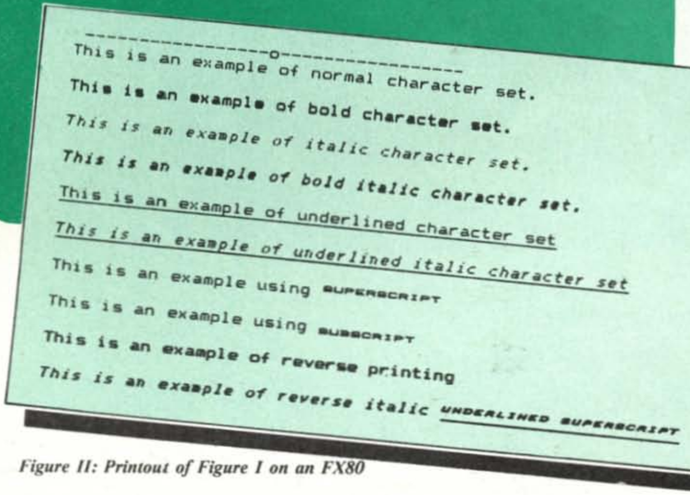
Figure I: The 80 column screen – what you really see



```
This is an example of normal character set.
This is an example of bold character set.
This is an example of italic character set.
This is an example of bold italic character set.
This is an example of underlined character set
This is an example of underlined italic character set
This is an example using SUPERSCRIPT
This is an example using SUBSCRIPT
This is an example of reverse printing
This is an example of reverse italic UNDERLINED SUPERSCRIPT
     As you can see this word processor is capable of a remarkable
number of different fonts.
Overtype Mode
```



```
-----------------o-----------------
This is an example of normal character set.
This is an example of bold character set.
This is an example of italic character set.
This is an example of bold italic character set.
This is an example of underlined character set
This is an example of underlined italic character set
This is an example using SUPERSCRIPT
This is an example using SUBSCRIPT
This is an example of reverse printing
This is an example of reverse italic UNDERLINED SUPERSCRIPT
```

Figure II: Printout of Figure I on an FX80

PROWORD is a new word processor for the BBC Micro, supplied on eprom for insertion into a paged ROM socket. It is available in two versions, ProWord for BBC Micros without a second processor – though it is Tube compatible – and HiWord which takes advantage of the extra memory available in the 6502 2nd processor.

A rather busy function key strip is supplied, a necessary inclusion as over 40 commands are shown on it.

Word processors come in two main styles. In the first, like Wordwise, text is typed on to the screen in an editing mode along with any print formatting commands.

This text looks nothing like the finished result as the correct format is only produced as it is being printed or previewed.

Others, such as View, are described as "What you see is what you get". In other words, you can type in text, format and reformat it in the editor to see how it appears before printing.

ProWord might be described as "what you see is really what you get" because it has the ability to produce various type styles on the screen.

This change probably reflects the fact that reasonably priced printers are now able to produce a variety of different character font styles.

The software is called up by typing *WP. This enters the editing screen directly, in Mode 3, the 80 column by 25 row display.

The edit function can be used in one of two modes – insert or overtype – with the mode chosen indicated in the bottom left of the screen.

After typing a few words it soon becomes apparent that the characters appearing on the screen are not those from the normal Acorn character set.

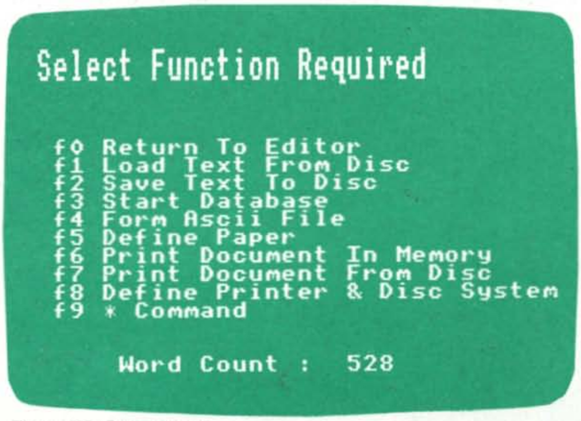
It is this ability to print a variety of different character styles that gives ProWord its distinctive appearance. As you can see from Figure I, this word processor is capable of a remarkable number of different fonts, either separately or in combinations.

Figure II shows the same text printed on an Epson FX80. The screen may not be reproduced exactly as it appears owing to missing features on printers.

Margins can be set by pressing Ctrl + function key 0. Across the bottom of the screen a row of numbers counting out the columns appears. The left and right cursor keys move markers showing where the left and right hand margins are. There is also a paragraph indent.

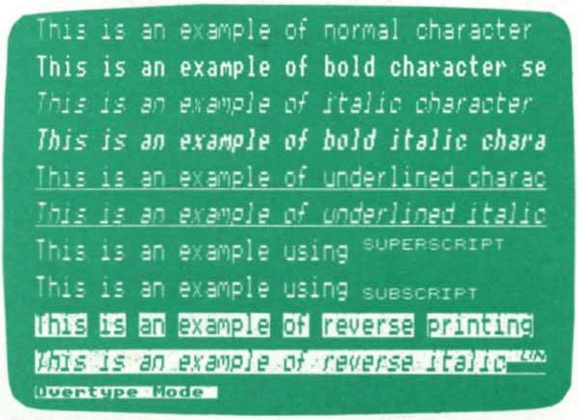
When copying, deleting and moving text in word processors like View and Wordwise, markers are placed at the start and end of the relevant text before pressing the appropriate function key.

→



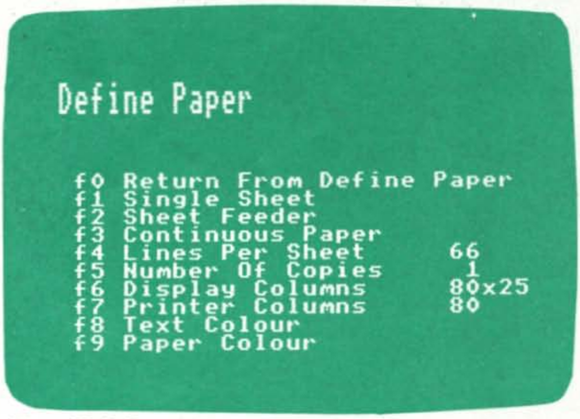
```
Select Function Required

 f0 Return To Editor
 f1 Load Text From Disc
 f2 Save Text To Disc
 f3 Start Database
 f4 Form Ascii File
 f5 Define Paper
 f6 Print Document In Memory
 f7 Print Document From Disc
 f8 Define Printer & Disc System
 f9 * Command

    Word Count :   528
```

Figure III: System menu



```
This is an example of normal character
This is an example of bold character se
This is an example of italic character
This is an example of bold italic chara
This is an example of underlined charac
This is an example of underlined italic
This is an example using SUPERSCRIPT
This is an example using SUBSCRIPT
This is an example of reverse printing
This is an example of reverse italic LIN
Overtype Mode
```

Figure V: Dump of 40 x 12 screen



```
Define Paper

 f0 Return From Define Paper
 f1 Single Sheet
 f2 Sheet Feeder
 f3 Continuous Paper
 f4 Lines Per Sheet         66
 f5 Number Of Copies         1
 f6 Display Columns         80x25
 f7 Printer Columns         80
 f8 Text Colour
 f9 Paper Colour
```

Figure IV: Define paper

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ProWord works rather differently. It works best with whole lines or paragraphs rather than sections of a line or paragraph, as there are no markers.

It uses a buffer in a cut and paste manner. To move a line elsewhere you first delete it to place it in the buffer. You then move the cursor to where the text needs to be placed. Pressing the "Restore line" function key will then copy the line (buffer) into its new position.

The "Find" facility is simple and flexible. You can search for any group of letters, either embedded in other words or by itself as a whole word.

Sensibly no discrimination is made between upper and lower case, making it more likely that you'll find what you're looking for.

There is also a Replace function that will change all occurrences of one string to another.

At the end of the day the most important function of the word processor is to allow you to lay the text out as you want it. Again, function key presses allow formatting of both lines and paragraphs.

They can be centred, lined up to the left or right, or padded out so that both left and right margins line up. Compared with others of its type ProWord is one of the easiest word processors to reformat.

Commands concerned with printing are prefixed with a tilde, ˜, placed at the start of a line.

There are no defaults for such things as the number of spaces at the top and bottom of the printed page. You have to set them, but once set they're not readily lost.

There are a number of features which include options to print just the odd or even numbered pages (for double sided documents), and page numbering including Roman numerals, which are handy for prefaces. If the whole of the text is not to be printed there are facilities for selective printing.

The "Chain file" command, placed at the end of a file, allows the processing to continue with another text file as if it were one continuous file.

Even more useful is "Include file". This acts more like a program subroutine.

Once you've completed all your editing and saved your text in a number of separate files, all that is required is to write a short series of printer directives including the files you require, in the correct order.

Surprisingly, on entering ProWord you go directly into the editing mode rather than a command page. More often you will not just want to start typing immediately, but to set various parameters first.

Function key 9 gives you the command page selecting the system menu, as shown in Figure III.

Loading and saving text is as quick as *LOADing or *SAVEing normally is. When updating files on disc it will not give a "Can't extend" error if there isn't enough space, but deletes the old file of the same name and tries to find a space that will take the whole file, in a similar manner to Wordwise Plus.

Text can be output to disc as a straight Ascii file, without any control codes, apart from line feed and carriage return. In this way it is possible to produce output suitable for compilers (successfully tested with the ISO-Pascal compiler) or even other word processors.

The "Define paper" option gives the

Screen size	Words	Memory
80 x 32	900	5¾k
80 x 25	1500	9¾k
80 x 12	900	5¾k
40 x 32	2500	15¾k
40 x 25	2800	17¾k
40 x 12	2500	15¾k

With a 64k BBC (B+ or 2nd processor) 4,000 words and with HiWord 6,000 words are possible in any screen mode.

Table I: Different screen sizes available

menu shown in Figure IV. A range of different screen sizes are available (see Table I).

As you might expect the limitation in readability is not so much with the word processor but with the screen that you use for display.

With a very poor TV and poor eyesight the 40 x 12 display is easiest to read (Figure V), but for most practical purposes it's much easier to format text with an 80 column screen.

Although it is claimed that there should be room for about 1,500 words in the 80 x 25 display, the software started to warn about the shortage of memory after approximately 1,300 words.

There is also a range of different printer widths – 40, 80, 120 and 160 columns. As these may be wider than the available screen display, the whole screen will pan over to see any columns further to the right in response to the cursor keys.

Even very simple printers are catered for. The inbuilt default printer driver can produce a number of effects, including underlining, bold printing and overtyping successive lines to produce new characters. To be able to do this the auto line-feed function on the printer must be switched off.

To be able to get the most out of any printer the word processor will need to know the special codes that are used by the printer to produce the effects. These are set with the "Define printer and disc" option.

A long series of questions has to be answered about the various capabilities of the printer as well as the codes required. A long sit down with a printer manual is a must.

Once set, the printer drivers can be saved to disc or tape as a file called !.PRINFO. If you are lucky enough to have access to more than one type of printer you'll need to keep different printer drivers on different discs.

A simple database is included. The software is able to switch between the word processor and database without disturbing the text. However because of the use of relative access filing only the disc system can use it.

The database is composed of a number of records, each with a maximum of seven fields holding up to 79 characters. Depending on the total length of a record, 300 or 400 individual records can be stored.

Data entry and editing is straightforward but utilitarian, with the Copy key used for editing. I would have thought that in a word processor this could have been better. Searches can be made and records printed.

The most important use of this database is to integrate with the word processor to produce a mailmerge facility. To produce this simply write your text as normal but where text from the database is required put a @ or ! sign followed by the field number.

When printing is started the @ and ! signs are looked for and replaced by data from the relevant field. The reason for two signs is that the ! causes the new text to be formatted to the existing specifications once it has been added. The @ just sticks it in regardless!

Not all the records have to be included, as a link and unlink facility can select the required ones.

The manual and ROM were written by the same person and as a result there is little in it about the fundamentals of word processing. It is more technically orientated, which makes it better suited for more experienced users rather than beginners.

In this one ROM more facilities have been combined that can be found in any other word processor around. As such it is a worthy challenger to the two big names of word processing, View and Wordwise.

Jim Notman

A toolkit for all disc filing systems

Advanced Disc Toolkit (ADT)
Advanced Computer Products

AS its name suggests, this toolkit specialises in utilities for the disc filing system, not just the standard 0.90 and 1.20 DFSs of the old 8271 disc interface, but also for the newer ADFS.

*HELP will display the 32 star commands available and their syntax (see Figure VI). To help prevent any clash of names with other installed software all the commands can be prefixed with an A. Not all are new, but may be missing from the various versions of the DFS.

It also adds DFS commands to the ADFS and vice versa. In some cases a familiar command has been extended. For example, *BACKUP will now use the second processor for quicker copying if requested.

The actual display of a number of the commands is controlled by the value of a parameter byte. Different options include disassembly of machine code – this includes 65C02 mnemonics – either a straight Ascii or hex dump, as well as a combined hex and Ascii dump.

Many of the commands that work on memory may act on any part of the memory including the input/output processor and its ROMs or the second processor.

ADT uses the current screen mode, so that 80 columns may be used to display more information at a time. The best way to gain an idea of the ROM's power is to examine the individual commands in detail:

***BACKUP,** similar to that in the DFS, makes an exact copy of one disc on to another.

***BFIND** will look for a string in a Basic program.

***BUILD** is a DFS command to write a text file, typed in at the keyboard,

→

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directly on to disc.

***CATALL** is a facility mainly for use with the ADFS which has a hierarchical directory tree. This is where a name in a catalogue may not be a file but another directory with other files, or even other directories, within it.

***DCOMP** will compare two discs to see if they are the same. This is a good check to see if *BACKUP has worked correctly.

***DEX** is the disc sector editor. It's one of the simplest to use yet it has the advantage that an 80 column screen will show the whole of a sector. The text of the screen can be printed by pressing Ctrl + P.

***DFIND** searches for strings on the disc.

***DIRALL**, another ADFS utility, lists all the current directory names as well as any directories that are within them.

***DUMP** is much extended from the DFS with the parameter byte controlling the type of dump to take place. This is now a much more useful command.

***ENVELOPE** lists any envelope definitions.

***FCOMP** compares two disc files, printing any differences between them.

***FCOPY** creates another copy of a file under a new name.

***FORM** is the built-in disc formatter for both the DFS and ADFS. The ROM automatically senses which is present.

***FREE** returns the amount of free and used disc space and number of file names on a disc.

***FSN** identifies the current filing system. Copes with all those commonly used like tape, DFS and ADFS as well as others such as teletext and IEEE.

***KEYL** lists function key definitions.

***LIST**, the same as for the DFS, will list a text file with line numbers.

***MAP** prints out a map of the free space on a disc.

***MDUMP**, similar to *DUMP but works on memory including a specified ROM or either processor if the Tube is active.

***MENU** displays all the files in the current directory on to the screen, so that one can be selected for LOADing, CHAINing, *RUNning or *EXECing, depending on the file.

***MEX** is the memory equivalent of *DEX. Pressing Tab will cycle through the various display modes. In the disassembler JMPs, JSRs and branches can be followed and the JSRs returned from. Ctrl + T will make it examine the other side of the Tube if active. This also has the print screen option.

***MFIND** searches memory for a specified string.

***MLOAD** loads a file and then moves it to a given address.

***MOVE** moves a block of memory, even across the Tube.

***MRUN** like *MLOAD, will load a file, move it in memory and then *RUN it.

***ROMS** lists all the ROMs present in the machine. Like the B+ it indicates language and/or service entry points.

***SECTORS** reads sectors from or writes sectors to a disc.

***SETADR** allows you to change the load and execution addresses of a file, but not its length.

***TYPE**, similar to *LIST but just prints out the text without any line numbers.

***UNPLUG** turns off a paged ROM without physically removing it. The DFS is one of the easiest to disable and remains disabled even through Ctrl + Break.

***VERIFY** checks that all the tracks on a disc can be read.

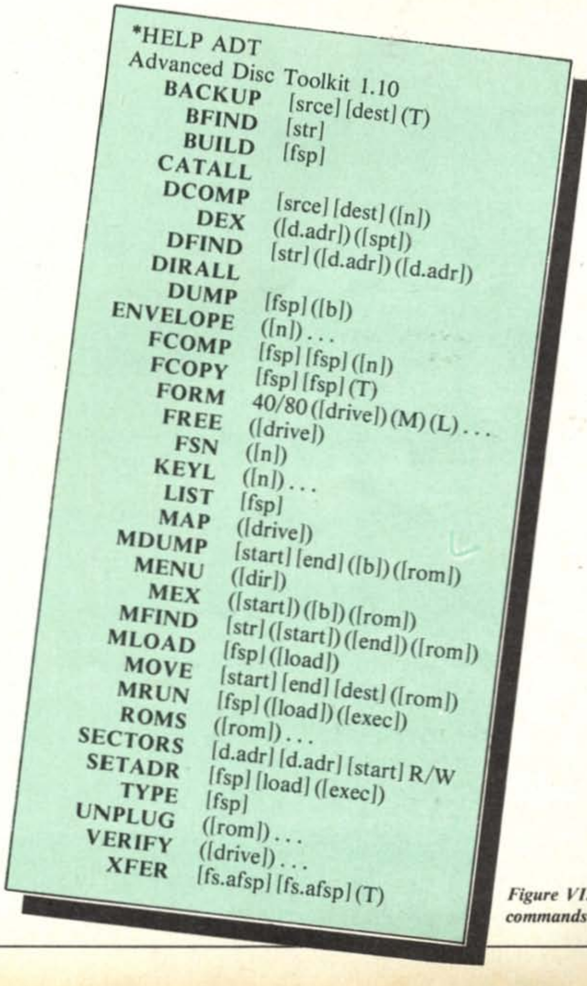
***XFER** is very useful for transferring files between different filing systems. This includes the DFS and ADFS.

Most of the main utility commands are covered here. I think that when a specialist disc toolkit is sold some of the extra non-disc commands are unnecessary and should be omitted so that extra disc utilities could be concentrated on. However on the whole ADT gets its choice of commands right.

The manual is clear and concise. The details of the commands are arranged in alphabetical order, with each starting on a new page.

Verdict? My review copy is now a permanent feature on my BBC Micro, much to the editor's chagrin.

Jim Notman



```
*HELP ADT
Advanced Disc Toolkit 1.10
  BACKUP   [srce] [dest] (T)
   BFIND   [str]
   BUILD   [fsp]
  CATALL
   DCOMP   [srce] [dest] ([n])
     DEX   ([d.adr]) ([spt])
   DFIND   [str] ([d.adr]) ([d.adr])
  DIRALL
    DUMP   [fsp] ([b])
ENVELOPE   ([n]) . . .
   FCOMP   [fsp] [fsp] ([n])
   FCOPY   [fsp] [fsp] (T)
    FORM   40/80 ([drive]) (M) (L) . . .
    FREE   ([drive])
     FSN   ([n])
    KEYL   ([n]) . . .
    LIST   [fsp]
     MAP   ([drive])
   MDUMP   [start] [end] ([b]) ([rom])
    MENU   ([dir])
     MEX   ([start]) ([b]) ([rom])
   MFIND   [str] ([start]) ([end]) ([rom])
   MLOAD   [fsp] ([load])
    MOVE   [start] [end] [dest] ([rom])
    MRUN   [fsp] ([load]) ([exec])
    ROMS   ([rom]) . . .
 SECTORS   [d.adr] [d.adr] [start] R/W
  SETADR   [fsp] [load] ([exec])
    TYPE   [fsp]
  UNPLUG   ([rom]) . . .
  VERIFY   ([drive]) . . .
    XFER   [fs.afsp] [fs.afsp] (T)
```

Figure VI: The star commands available

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THANKS FOR THE MEMORY..

DAVID HARPER offers an automatic up-and-down-loader to utilise every bit of disc space

ONE of the commonest complaints about the disc system on the BBC Micro is the amount of memory it uses up. PAGE is set to &1900 rather than &E00, the usual for a system without discs, and that means 2¾k less RAM.

Disc users learn pretty quickly that things are not actually quite as bad as they seem. For most purposes PAGE does not need to be this high, and you can actually set it as low as &1100 and still load and save programs (though not use data files).

Even so, this leaves you with ¼k less memory than a tape user has, and in Modes 0, 1 and 2 that can be quite significant.

There are several ways round the problem, such as buying a second processor or re-writing all your large programs to use a system of overlays.

The easiest solution, though, is to download – you load in the program with PAGE at &1900, swap to the tape system, reset PAGE, and copy the program down in memory. In past issues of *The Micro User* there have been several descriptions of how to set up a function key to do this, and you can make a program do it for itself. (See page 101 of the May 1985 issue of *The Micro User*.)

Downloading is fine if all you want to do is load and run a program. It is not so good though when you are trying to write and de-bug one.

If your program uses too much memory to run with PAGE above &1000 you have to download it every time you want to try it out. But then, if you want to save it, you first have to upload it again and re-activate the disc system.

Before very long you end up kicking yourself as yet another, quite avoidable, "Bad mode" or "No room" error appears, or else you are tearing your hair at having tried to save without uploading and so corrupted your program beyond recall.

In addition to these problems, once you have put a program in the DFS workspace between &E00 and &10FF it is awkward to switch the disc system on as *DISC will not now work properly.

So here is a program to do it all for you without the hassle. To use it, type it in and RUN it, and then save the machine code with:

```
*SAVE RAMSAVE 900 9F3
```

Then whenever you want to use it *RUN the code (or simply use *RAMSAVE) before you start editing. This will set PAGE to &E00 and temporarily switch off the DFS. However, whenever you use SAVE, LOAD or CHAIN, the DFS is re-enabled and your program is saved to or loaded from disc.

What happens is that when you enter LOAD "PROG" the disc system is initialised, the program is loaded from disc starting at location &1900, then the DFS is disabled and finally the program is downloaded to &E00.

If you type SAVE "PROG", your program at &E00 is uploaded to &1900, it is saved to disc after switching on the DFS, and finally it is downloaded again to where it started from.

Your program is also downloaded if a DFS error occurs during a SAVE operation, because it would be at location &1900 when the error occurred. In the case of an error during LOAD you will get a "Bad program" message – just type NEW or try again.

The program works by intercepting the file vector at locations &212 and &213. So when a call is made through this vector, as happens when Basic uses SAVE, LOAD or CHAIN, the program goes into action. On the whole I think it is fairly easy to see what is going on.

The actual address of the machine code is not critical. I have used page 9 because this is not often used by the OS, but some programs use it for envelopes or other machine code routines.

You could put the RAMSAVE routine in any of pages 9 to &C – just alter line 80. Don't use page &D, though, or the program will be destroyed when it calls the DFS routines. Also it should be kept within a single memory page.

The main problem with RAMSAVE is that it only works for LOAD, SAVE and CHAIN. If you use any other filing system commands such as *CAT or *RUN they will operate on the tape system. Other DFS commands like *RENAME will just give a "Bad command" error. The current director, drive and so on are also reset to the default values, and you have no way of altering these, though you can still specify them in the filename.

Do note that this program is only designed to cope with Basic programs. *LOAD and *SAVE will not work correctly and will corrupt your program. You may also have problems if you have more than one Basic program in memory at once.

PROGRAM DESCRIPTION

140-390	Initialise the program. They insert PAGE=&E00 and NEW into the keyboard buffer, switch to tape and reset the file vector and BRK vector. Lines 230 to 360 are used to reset everything after each file operation. Lines 370 to 390 create the characters to be inserted into the buffer, terminating with 0.
430-480	New entry point for OSFILE calls. It stores the register values and checks A to test whether it is loading or saving. (A is set to 0 for SAVE and &FF for LOAD.)
490-810	SAVE routine. Lines 520 to 680 alter a couple of necessary pointers in the OSFILE control block and set some counters for uploading. Lines 700 to 780 upload the program. After these a couple of subroutines are called to complete the SAVE.
820-950	LOAD routine.
960-1290	Main action routines for both loading and saving. Lines 1000 to 1030 ensure that DFS errors will be trapped. 1050 to 1210 initialise the disc system. It is not enough just to issue a *DISC command, since the DFS workspace has been corrupted. However *DISC does work if you first clear this area of RAM and lines 1050 to 1170 do this. After switching the DFS on line 1250 calls the LOAD or SAVE routine and then disables the disc system.
1300-1470	Downloading routine.
1480-1560	Handles errors. If an error occurs while RAMSAVE is active and if the Basic program was being saved, the latter is downloaded.
1580	Provides the command line *DISC so that OSCLI can be called at line 1210.

VARIABLES

fileV, brkV	File and BRK vectors in page 2.
discpage	PAGE value (DIV &100) when the disc system is active. Programs are uploaded to and downloaded from this address. It can be altered slightly if the program on its own, apart from dynamic variables space, is too large to fit in memory. With the Acorn DNFS 1.2 do not alter it below &18.
tapepage	PAGE value at which programs are RUN. You can try altering this downwards if you like, but you may get unpredictable results, depending on which DFS you have.
blockadd	Address of the control block passed to OSFILE in the X and Y registers is stored in these two locations.
lower, upper	Lower and upper addresses of the start of the current page when uploading and downloading. Lower is also used when clearing the DFS RAM area.
ctrl	Control byte passed to and from OSFILE in the A register is stored here.
length	This contains the length of the program (in pages) when uploading and downloading.

```
   10 REM Automatic Up/Down Loader
   20 REM   (c) The Micro User
   30 *DISC
   40 fileV=&212:brkV=&202
   50 osbyte=&FFF4:oscli=&FFF7
   60 discpage=&19:tapepage=&E
   70 blockadd=&70:lower=&72:upper=&7
4:ctrl=&76:length=&77
   80 locn=&900
   90 FOR I%=0 TO 2 STEP 2
  100 P%=locn
  110 [OPT I%
  120 \Insert PAGE value and "NEW" in
to
  130 \keyboard buffer
  140 .inloop
  150 LDA #&8A
  160 LDX #0
  170 .textadd
  180 LDY pagetext   \First address
  190 BEQ discoff    \All sent
  200 JSR osbyte
  210 INC textadd+1  \Next character
  220 BNE inloop
  230 .discoff
  240 LDA #&8C       \Do *TAPE
  250 JSR osbyte
  260 \Set file vector to point to co
de
  270 \and reset BRK vector
  280 LDA #start MOD 256
  290 STA fileV
  300 LDA #start DIV 256
  310 STA fileV+1
  320 LDA #?brkV
  330 STA brkV
  340 LDA #brkV?1
  350 STA brkV+1
  360 RTS
  370 ]:pagetext=P%:$pagetext="PAGE=&
"+STR$~(tapepage*&100)
  380 newtext=pagetext+LEN$pagetext+1
:$newtext="NEW"
  390 ?(newtext+LEN$newtext+1)=0
  400 P%=newtext+LEN$newtext+2
  410 [OPT I%
  420 \True start (fileV points here)
  430 .start
  440 STA ctrl
  450 STX blockadd
```

Turn to Page 137

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HI-VIEW – A disc based version of this popular word processor for the 6502 second processor giving 47k of user memory. **£44.95 (b)**

VIEWSHEET – Acorns spreadsheet rom giving 255 rows by 255 columns, multiple windows, works in any mode, wide use of function keys, fully compatible with View. **£47.95 (b)**

VIEWSTORE – Acorns new database new database rom. Works in any screen mode, many powerful sorting facilities, can be spreadsheet or user defined card layout. Max record size is 60k. Output can be sent to View and Viewsheet. Comes with comprehensive manual, utilities disc etc. **£54.95 (b)**

GRAPHICS ROM – Acorns new 16k graphics rom giving many new commands for extensive graphics. Circles, ellipses, arcs, rectangles, parallelograms, segments and sectors etc are all available. Comes with manual and utility cassette.
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ISO-PASCAL – A full implementation of the ISO standard supplied on two roms with two comprehensive guides. 6502 disc version also supplied. **£59.95 (d)**

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WHILE...WEND

Take a step or two with ROBIN NIXON down the road to more structured programming

IF you're looking for a way to WHILE away the time why not WEND your way in the direction of more structured programming?

You will no doubt be very familiar with FOR ... NEXT and REPEAT... UNTIL loop structures and probably use them several times in most of your programs.

But have you ever felt that neither FOR ... NEXT nor REPEAT ... UNTIL were quite what you wanted for a particular piece of code? Sometimes you need a little extra.

To see why let's have a quick look at these two structures. FOR ... NEXT is a loop that will execute a fixed number of times. For example, the following program will loop exactly 100 times:

```
10 FOR X=1 TO 100
20 PRINT X
30 NEXT X
40 END
```

This is all very well unless you want to be able to break out of the loop for any reason. Perhaps you want the user to have the option of pressing Space to stop. You could allow for this in the following way but it is sloppy programming:

```
10 FOR X=1 TO 100
20 PRINT X
30 IF INKEY$(0)=" " THEN X=100
40 NEXT X
50 END
```

Obviously the way we get around this on the BBC Micro is to use a REPEAT ... UNTIL loop, as in the following:

```
10 X=0
20 REPEAT X=X+1
30 PRINT X
40 UNTIL X=100 OR INKEY$(0)=" "
50 END
```

However there is still a limitation here. Supposing you hold the Spacebar down right from the start of program execution. No matter what you do *X* will still reach a value of 1 which will be printed out.

Admittedly you would have to have very fast reflexes to hit the Spacebar immediately after running the program, but this is purely an example. Anyhow, how could we stop this from happening?

This is where WHILE ... WEND comes into its own. Have a look at the following program:

```
10 X=0
20 WHILE X<100 AND INKEY$(0)<>" "
30 X=X+1
40 PRINT X
50 WEND
60 END
```

The difference between this and a REPEAT ... UNTIL loop is that the condition is checked before the instructions inside the loop are executed, rather than after.

In other words, if the condition after the WHILE in line 20 is true the instructions inside the loop will be executed, and if the condition is false program execution will jump to the next WEND.

There are many cases when you want a number of things to happen when a certain condition is true. In Pascal, you would use IF and END IF. This is similar to Basic, except that if the condition following the IF is true all instructions following it are executed until an END IF is encountered.

So you can see that WHILE ... WEND can be used as a multi-line IF. For example:

```
10 X=0
20 Y=100
30 Z=1000
40 WHILE X<100 AND Y>50 AND Z<1200
50 X=X+1
60 Y=Y-1
70 Z=Z+2
80 PRINT X,Y,Z
90 WEND
100 END
```

Lines 50-80 could have been made part of a multi-statement line, but I think you'll agree that it is easier to follow a program which has as few multi-statement lines as possible.

You might argue that you could use the following structure putting the statements to be executed in PROCb, as here:

IF a THEN PROCb

You would be right. But then, that would be your personal choice. Were I debugging a program with a large number of procedures in it I would have to keep going backwards and forwards to follow the flow of the program. Using WHILE ... WEND the program flow is kept up.

I am not saying that you could replace procedures with WHILE ... WEND, as you would then not have local variables and would not be able to pass parameters. But careful use of WHILE ... WEND can make programs easier to write and to follow.

To use the command in your programs, type in Listing I and then save it. When you run it the object code

→

> *'Careful use of WHILE ... WEND can make programs easier to write and follow'*

From Page 57

is assembled at &900 and then saved to tape or disc as a file called WW. To use this in future type *RUN WW.

To keep the code short I call the Basic ROM in various places. As there are many differences between the Basic I and Basic II ROMs, the program makes a conditional assembly. This means that if you assemble WW on a Basic II micro it will not work on a Basic I micro and will tell you so. Likewise if you assemble in Basic I and try to run in Basic II.

By the way, with this utility you can't have nested WHILE ... WEND loops. But as an added bonus, if you use WHILE ... WEND in a program and press Escape you can go back to the last WHILE statement by simply typing WEND, thus providing the additional feature of something similar to CONT (or continue) which the BBC Micro does not have.

```
  100 REM **********************
  110 REM *                    *
  120 REM *     WHILE-WEND     *
  130 REM *                    *
  140 REM *   By Robin Nixon   *
  150 REM *                    *
  160 REM * (c) The Micro User *
  170 REM *                    *
  180 REM **********************
  190 MODE6
  200 oswrch=&FFEE
  210 osword=&FFF1
  220 osbyte=&FFF4
  230 PROCinit
  240 FOR PASS=0 TO 3 STEP 3
  250 P%=&900
  260 [OPT PASS
  270 SEI:LDA &24B:STA &F4:STA &FE30:
CLI
  280 LDA dummy:CMP &8015:BEQ vectors
  290 LDX #0
  300 .errorloop
  310 LDA errormessage,X:CMP #0:BEQ e
nderror
  320 JSR oswrch:INX:JMP errorloop
  330 .errormessage
  340 OPT FNequs(CHR$13+CHR$10+"This
utility is for BASIC"+CHR$32)
  350 .dummy
  360 OPT FNequb(basic1or2)
  370 OPT FNequs(CHR$32+"only!"+CHR$1
0+CHR$13+CHR$0)
  380 .enderror
  390 RTS
  400 .vectors
  410 LDA &202:LDX &203
  420 CMP #start MOD &100:BNE changeb
rkvector
  430 CPX #start DIV &100:BEQ already
changed
  440 .changebrkvector
  450 STA &70:STX &71
  460 LDA #start MOD &100:STA &202
  470 LDA #start DIV &100:STA &203
  480 .alreadychanged
  490 RTS
  500 .start
  510 PHA:TYA:PHA:TXA:PHA
  520 LDY #0:LDA (&FD),Y:CMP #4:BEQ m
istake
  530 .notnewword
  540 PLA:TAX:PLA:TAY:PLA:JMP (&70)
  550 .mistake
  560 LDA #newkeytable MOD &100:STA &
39
  570 LDA #newkeytable DIV &100:STA &
3A
  580 LDY &A:DEY:TYA:CLC:ADC &B:STA &
37:LDA &C:ADC #0:STA &38:JSR nextword
  590 BCS notnewword
  600 DEY:TYA:CLC:ADC &A:STA &A
  610 PLA:PLA:PLA:PLA:PLA:PLA:PLA:PLA
  620 JMP (&37)
  630 .nextword
  640 LDY #0:LDA (&39),Y
  650 BEQ nomatch
  660 CMP (&37),Y:BNE different
  670 .nextcharacter
  680 INY:LDA (&39),Y:BEQ getaddress
  690 CMP (&37),Y:BEQ nextcharacter
  700 .different
  710 INY:LDA (&39),Y:BNE different
  720 INY:INY:TYA:SEC:ADC &39:STA &39
  730 LDA &3A:ADC #0:STA &3A
  740 JMP nextword
  750 .getaddress
  760 INY:LDA (&39),Y:STA &37:INY
  770 LDA (&39),Y:STA &38:DEY:DEY:CLC
:RTS
  780 .nomatch
  790 SEC:RTS
  800 .newkeytable
  810 OPT FNequs("WHILE")
  820 OPT FNequb(0)
  830 OPT FNequw(while)
  840 OPT FNequs("WEND")
  850 OPT FNequb(0)
  860 OPT FNequw(wend)
  870 OPT FNequb(0)
  880 .quit
  890 JSR checkstatementend:JMP conti
nue
  900 .while
  910 LDA &A:STA &1B:STA &8D:LDA &B:S
TA &19:STA &8E:LDA &C:STA &1A:STA &8F
  920 .while1
  930 JSR evaluateexpression:LDA &2A
  940 CMP #0:BNE true
  950 LDA &1B:CLC:ADC &19:STA &B:LDA
&1A:ADC #0:STA &C:LDA #0:STA &A
  960 .findwend
  970 JSR get:CMP #ASC"W":BNE findwen
d
  980 JSR get:CMP #ASC"E":BNE findwen
d
  990 JSR get:CMP #ASC"N":BNE findwen
d
 1000 JSR get:CMP #ASC"D":BNE findwen
d
 1010 INC &A:JMP quit
 1020 .true
 1030 LDA &1B:STA &A:LDA &19:STA &B:L
DA &1A:STA &C:JMP quit
 1040 .wend
 1050 LDA &8D:STA &1B:LDA &8E:STA &19
:LDA &8F:STA &1A:JMP while1
 1060 .get
 1070 LDA &B:CLC:ADC #1:STA &B:LDA &C
:ADC #0:STA &C:LDY #0:LDA (&B),Y:RTS
 1080 ]NEXT
 1090 PRINT'"Press SPACE to save the
object code";:REPEATUNTILGET=32
 1100 *SAVE WW 900 A75
 1110 PRINT''"The object code has bee
n saved as WW":END
 1120 DEFPROCinit:IF ?&8015 = ASC"1"
PROCbasic1:ENDPROC ELSE PROCbasic2:EN
DPROC
 1130 DEFPROCbasic1:basic1or2=ASC"1"
 1140 checkstatementend=&9810
 1150 continue=&8B0C
 1160 evaluateexpression=&9B03
 1170 ENDPROC
 1180 DEFPROCbasic2:basic1or2=ASC"2"
 1190 checkstatementend=&9857
 1200 continue=&8B9B
 1210 evaluateexpression=&9B29
 1220 ENDPROC
 1230 DEFFNequs(string$)
 1240 $P%=string$
 1250 P%=P%+LEN(string$)
 1260 =PASS
 1270 DEFFNequb(byte)
 1280 ?P%=byte
 1290 P%=P%+1
 1300 =PASS
 1310 DEFFNequw(word)
 1320 ?P%=word MOD &100
 1330 P%?1=word DIV &100
 1340 P%=P%+2
 1350 =PASS
```

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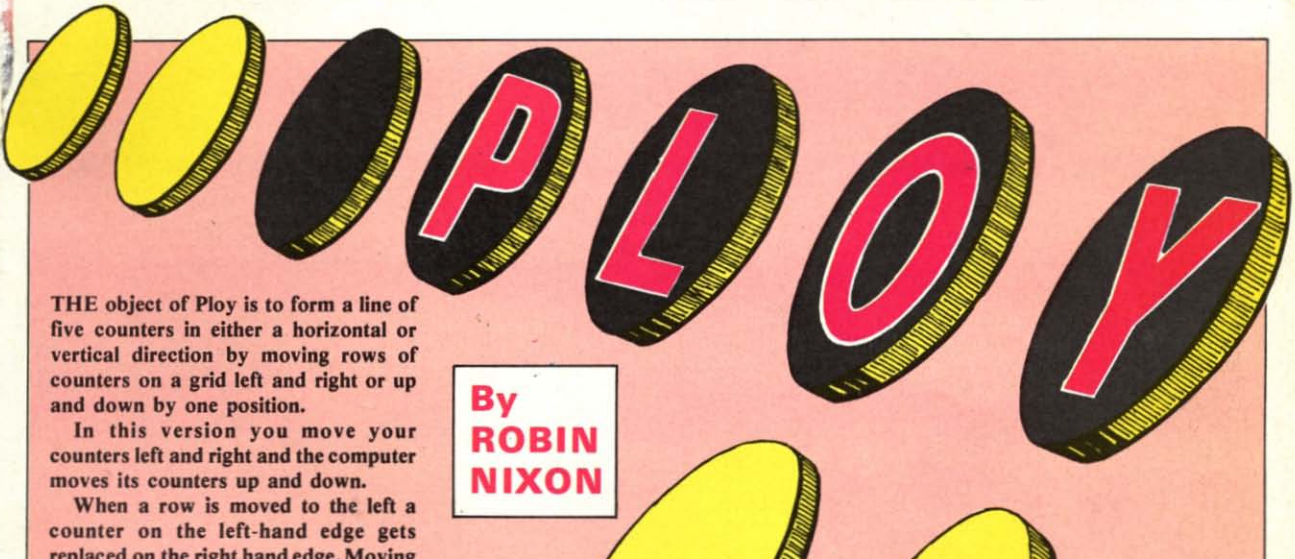


By
ROBIN
NIXON

THE object of Ploy is to form a line of five counters in either a horizontal or vertical direction by moving rows of counters on a grid left and right or up and down by one position.

In this version you move your counters left and right and the computer moves its counters up and down.

When a row is moved to the left a counter on the left-hand edge gets replaced on the right hand edge. Moving rows to the right, up or down causes counters at the edge to wrap round in a similar way.

After each of the computer's goes its last move is shown at the top of the column it moved. A U shows that the row was moved up and a D that it was moved down.

To select the row you wish to move press the Spacebar until that row is highlighted in black, then press Return.

To then select the direction in which you wish to move the row press the Spacebar until that direction is highlighted in black and press Return.

Pressing S alternates between turning the sound on and off.

Although Ploy has been designed as a simple introduction to strategy games I think you will find it quite hard to beat until you've got the hang of it.

Disabled people with switches connected to the fire button inputs of the joystick port can also play this game using switch 1 for Spacebar and switch 2 for Return.

You are advised to turn lines 190 & 200 (which trap Escape and Break) into REM lines until the program has been fully de-bugged.

MAJOR VARIABLES

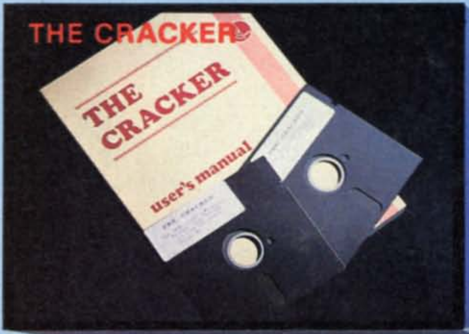
CW%	Set if the computer has won.
HW%	Set if the player has won.
COL%	Teletext colour code for printing.
MV%	Number of moves made.
BM%	Value of the computer's best move.
SD%	Set to 1 if the sound is on or 2 if it is off.
A%(8,8)	The board.
B%(8,2) **C%(8,2)**	Hold the worth of certain moves during the computer's look ahead.
PL$	Scrolling title message.

PROCEDURES

ploy	Displays title at top of the screen.
background	Sets up background colours of the screen.
text(TC%)	Sets up a text window with a foreground colour determined by TC%.
banner	Sets up the title page where the title, player and copyright messages are displayed.
read_data	Reads the data for the start positions of the counters into the array A%.
board	Displays the counters in their current positions.
select_row	Input routine for selecting which row to move left or right.
left_or_right	Selects the direction of move.
adval	Waits for input from the Spacebar, Return or S. Button zero can be used to replace the Spacebar and button one for Return. If S is pressed PROCsound will be called.
move_left **move_right** **move_down** **move_up**	Move a selected row or column by one position in the relevant direction. If a counter comes off the edge of the board it is replaced at the opposite edge.
time_init	Resets TIME to zero and displays "My move . . ." in the banner.
time	Shows time elapsed during computers turn.
computer-play	Selects a column to be moved up or down for the computer's go.
check_play	Used by PROCcomputer_play to check the relative worth of a possible move.
sound	Each time PROCsound is called by PROCadval it alternates between turning the sound on and off.
game_over	Displays message "GAME OVER" in the banner along with the result of the game and number of moves taken.
init_title	Creates the copyright string used by PROCtitle.
title	Scrolls copyright message from right to left a third at a time.

Full listing starts on Page 138

BBC ?-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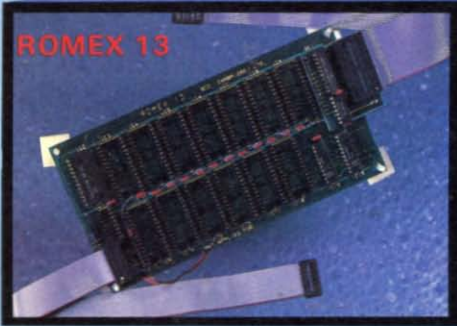

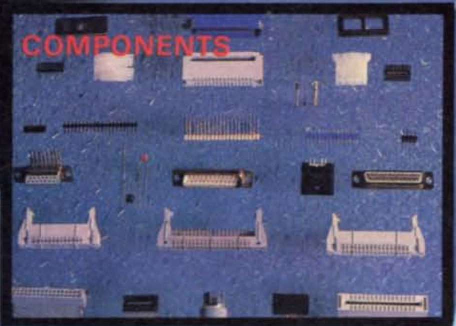
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Now LET us see what variables are

Part 2 of PETE BIBBY's series aimed at the micro novice

FROM last month's article you should remember that entering:

```
PRINT "a"
```

and pressing the Return key will produce an a on the screen, while:

```
PRINT 3
```

will produce the number 3. As we saw, PRINT can be used for displaying strings and doing sums with numbers (in the case of PRINT 3 there were no other numbers so 3 was the result).

Now try:

```
PRINT a
```

and see what you get when you press Return (and that's the last time I'll remind you).

As you might expect from what you already know, you get an error message – in this case:

```
No such variable
```

This is as it should be, as a is neither a number nor a string (which has to be enclosed in quotes). But why that particular message? What's a variable?

LET there be variables

To show what a variable is we have to learn another Basic keyword, LET. Try entering:

```
LET a=5
```

and see what happens.

From the looks of things nothing's happened, but don't let appearances fool you. Below the surface of the micro, the Basic interpreter is beavering away all the time and when it comes across the command LET it leaps into action. Just what it does is shown by getting the micro to:

```
PRINT a
```

when, magically, 5 appears.

Obviously the LET statement has arranged things so that the letter *a* now 'stands' for 5. That's why there's no nasty:

```
No such variable
```

message this time when you:

```
PRINT a
```

It's because the LET has created a variable named *a*. When the BBC Micro comes across the *a*, it knows that it's not a string (no quotes), it's certainly not a number, so it must be a variable.

It then looks up an internal list of all the variables, if any, that have been created by LET to see what value *a* should have. If it can't find one it tells you, quite rightly, that's it's never heard of it. There's no such variable!

Once you've created a variable with a LET you can use it just as though it was a number. After making sure that you've created the variable with:

```
LET a=5
```

– technically known as an assignment statement – you can use it in sums as in these lines:

```
PRINT a+3
PRINT 2*a
PRINT a+a
```

Try making up your own variables, LETting them have the values of your choice. And, if the screen gets untidy, wipe it clean with a quick CLS. Notice, however, that CLS only clears the screen, it doesn't do anything else to the micro.

The variable *a* is still there, as you can see if you enter:

```
PRINT a
```

Variables vary

When you think about it, so far our solitary variable, *a*, hasn't varied at all. It's just stood for one value, in this case 5. In fact, the variable *a* is rather more than just a name that can be used in place of a number, as you'll see if you now enter:

```
LET a=6
```

and then:

```
PRINT a
```

The second LET has given *a* the value 6. The micro, fickle beast, forgets all about the previous value *a* may have had and from now on when it comes to an *a* it substitutes the value 6. And if it comes across another LET such as:

```
LET a=123
```

the faithless brute now takes *a* to mean the value 123.

It doesn't always have to be a single number on the right of the equals sign, it can be an expression as:

```
LET a=3+3
PRINT a
```

shows. You can even use a variable in the expression, as you'll see from the lines:

```
LET b=4
LET a=b+7
PRINT a
```

Here *b* is added to 7 and the result, 11, is stored under the label *a*. You can even use the same variable name on

From Page 65

both sides of the assignment. Try:

```
LET b=3
LET b=b+5
PRINT b
```

to see what happens. In this case *b* is originally given the value 3. The second LET tells the micro to take the value of *b*, add five to it and call the new value *b*. The old value of *b* is overwritten. This use of the same variable name may look a trifle silly (after all, why not:

```
LET c=b+3
```

which leaves *b* intact?) but it is used a lot when updating the values of variables.

As you LET the micro have different values for a variable, so the value of the variable varies. It only holds the last number it was given, any previous value being ignored or "overwritten". Hence the term variable. It's a name or label that stands for a number, but which particular number depends on the last assignment statement. This idea of a variable taking different values is fundamental to programming. And if it seems a little strange, it shouldn't be as we do it all the time.

You probably know that the area of a rectangle is its length times width. If the length of one side is 3 metres and the width 2, the area is 3 times 2 square metres. If the length is 10 and the width 5, the area is 50.

To get the area of a particular rectangle you just substitute values for the terms *length* and *width* in the formula. And *length* and *width* are variables, names that stand for values, the values varying from case to case.

Yet more varying variables

Set up four variables with:

```
LET total=0
LET a=1
LET b=2
LET c=3
```

and now:

```
LET total=total+a
```

You should be able to see that the variable *total* will now hold the value 1. Check it with:

```
PRINT total
```

and then:

```
LET total=total+b
```

If you now:

```
PRINT total
```

you'll see that it has a new value, 3. This doesn't last long as:

```
LET total=total+c
```

brings *total* up to 6 as a final:

```
PRINT total
```

confirms. The point to grasp is that the variable *total* has been used to hold a running total of three other variables. At any time the value held in *total* reflects the numbers that have been added so far. It acts as a kind of memopad.

To test your knowledge of variables,

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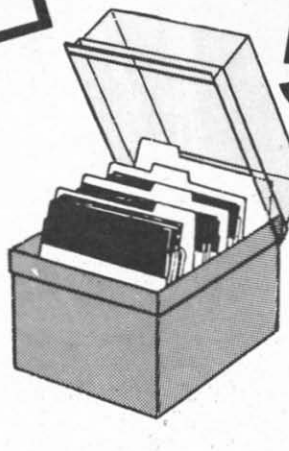

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try to spot the difference between:

```
LET number=4
PRINT number+3
```

and:

```
LET number=4
LET number=number+3
PRINT number
```

Both give display the number 7 but they do it in different ways. In the first case the value of *number* is still 4. It's been used in a sum but not changed. In the second, it's changed to 7 before being PRINTed.

Variable rules, OK?

You can call your variables anything you like, so long as they obey a few simple rules. For a start they must begin with a letter. The rest of the name can be made up of letters and numbers as you like so:

```
LET 1sttime=1
```

is wrong giving you a syntax error message to tell you you've broken the rules of BBC Basic. However:

```
LET time1=1
```

is acceptable.

Also, you can't have punctuation marks, spaces or arithmetic operators (+, −, *, /) in a name so *cats+dogs, running total,* and *bonus!* are right out as far as the BBC Micro is concerned.

The last rule is that the variable name can't begin with a Basic keyword as it confuses the micro. So:

```
LET PRINTERCOST=200
```

is wrong as PRINT is a Basic keyword. You can however have:

```
LET printercost=200
```

This is because, unlike some micros, the BBC Micro can tell the difference between upper and lower case. This means that:

```
LET CAPITAL=1000
```

and:

```
LET capital=1000
```

produce two different variables, *capital* and *CAPITAL*.

Having said that, though, don't do things like that as it can cause mix-ups. Just because a complication is allowed doesn't mean that it has to be used. The rule in programming is KISS which stands for Keep It Simple, Stupid!

RULE	WRONG	RIGHT
No spaces in variable name	sleeping dogs	sleepingDogs
Must not start with number	2ndtime	secondtime
No punctuation marks in name	pete's	petes
No arithmetic operators	night+day	nightAndDay
Can't start with keyword	LETTERS	

Figure I: Rules for naming variables

Figure I sums up the rule for naming variables.

A simple program

Now for something completely different. Try typing in:

```
10 PRINT "Anystring"
```

and see what happens. The answer is nothing. The line just sits there even though you've pressed Return. This is rather different from:

```
PRINT "Anystring"
```

which has:

```
Anystring
```

appearing on screen immediately.

The difference lies in the 10 that starts the line. Until now, everything that we've typed into the micro such as:

```
PRINT "This starts with a keyword"
```

or:

```
CLS
```

has started with a keyword and been obeyed at once. This is using the BBC Micro in command mode.

However if the line begins with a number things are different. Now the micro waits until you tell it you want it to process or obey that line. There's a gap between typing in the line and performing it. The Basic interpreter, the brains of the micro, stores it away in its memory until it's needed. So:

```
10 PRINT "Anystring"
```

is tucked away in the micro's memory, biding its time. Prove this to yourself by clearing the screen with CLS and then enter:

```
LIST
```

when:

```
10 PRINT "Anystring"
```

will appear again. As you'll have guessed, LIST is a keyword that forces the micro to divulge all the numbered lines it has tucked away in its memory. These numbered lines make up a program, of which a lot more will be said.

Now let's get the micro to process the line numbered 10, the only one it has so far, with:

```
RUN
```

which results in:

```
Anystring
```

appearing on the screen.

Congratulations. You've just run your first program. Lots more next time.

PROBLEM

MY BBC Micro will not print to screen the letters S G H J L C N but if I bend the bottom left hand side of the keyboard down slightly every thing prints all right. I assumed from this that I had a dry joint.

I turned the computer off and touched my soldering iron on to several of the joints on the left hand side of the keyboard, including the ribbon cable connections, but not on any of the chip connections.

I now cannot get any letters on the screen at all. Help, what have I done? – R.H. Hodges. Northampton.

SOLVED

Your problem was not a dry joint but a track cracked next to the soldered joints. By applying a soldering iron the solder next to the crack has retreated.

Find the crack with a continuity meter and solder a small wire over it to solve the problem.

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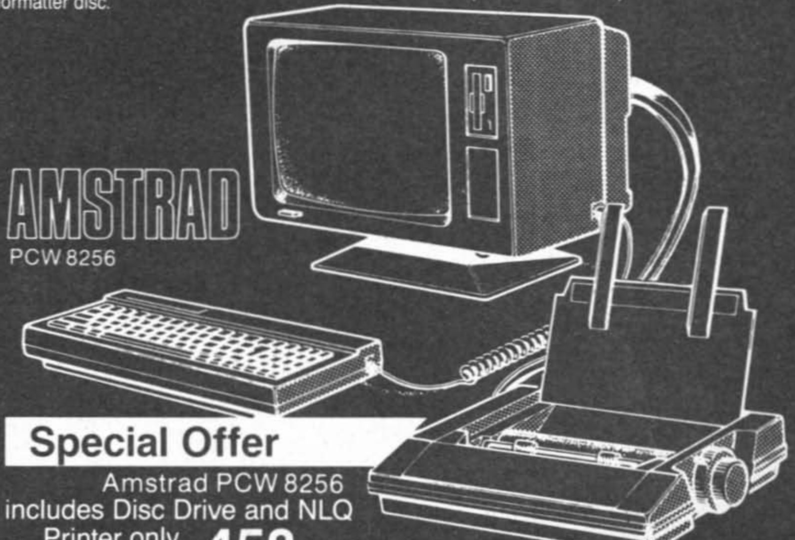

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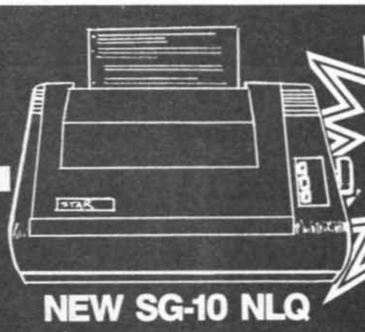

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```
 2230 REPEAT get2%=GET:UNTIL (get2%>&
30 AND get2%<(entries%(number%)+&31)
AND NOT((get2%=&37) AND (number%=1) A
ND lock%)) OR (get2%=&D)
 2240 IF get2%<>&D THEN PRINTTAB(0,(g
et%*2)+1);" ":get%=get2%-&30:GOTO 222
0
 2250 main_menu%=FALSE
 2260 =get%
 2270 REM FN's to display status next
 to menu entry
 2280 DEF FN_STATUS
 2290 Z%=4
 2300 REPEAT Z%=Z%-1:UNTIL file%?&34>
=status%(Z%)
 2310 =menu$(7,Z%)
 2320 DEF FN_RATING
 2330 Z%=10
 2340 REPEAT Z%=Z%-1:UNTIL (file%!&47
 AND &FFFF)>=rating%(Z%)
 2350 =menu$(6,Z%)
 2360 DEF FN_MISSION
 2370 IF ?file%=6 THEN =menu$(8,4)
 2380 Z%=0
 2390 REPEAT Z%=Z%+1:UNTIL ?file%=mis
sion%(Z%)
 2400 =menu$(8,Z%)
 2410 DEF FN_ENERGY
 2420 Z%=file%?&2B
 2430 IF Z%>3 THEN Z%=3
 2440 IF Z%=0 THEN ="Not Present" ELS
E =menu$(3,Z%+1)
 2450 DEF FN_LASER
 2460 Z%=0
 2470 REPEAT Z%=Z%+1:UNTIL file%?(A%+
&F)=laser%(Z%)
 2480 =menu$(4,Z%)
 2490 DEF FN_GOT(A%)
 2500 IF A% THEN ="Present" ELSE ="No
t Present"
 2510 DEF FN_INPUT(X%,Y%,L%,max,point
%)
 2520 LOCAL input$
 2530 VDU 23,1,1;0;0;0;
 2540 PRINTTAB(X%,Y%);SPC(L%);TAB(X%,
Y%);
 2550 input$=""
 2560 REPEAT get%=GET:UNTIL (get%>&2F
 AND get%<&3A) OR (get%=&2E AND point
%) OR (get%=&7F) OR (get%=&D) OR (get
%=&15)
 2570 IF get%=&15 THEN 2540
 2580 IF get%<>&7F THEN 2610
 2590 IF input$<>"" input$=LEFT$(inpu
t$,LEN(input$)-1):VDU &7F
 2600 GOTO 2560
 2610 IF LEN(input$) THEN P%=INSTR(in
put$,".") ELSE P%=0
 2620 IF get%=&2E AND P% THEN 2560
 2630 IF P% AND (P%<LEN(input$)) AND
get%<>&D THEN 2560
 2640 IF get%<>&D AND LEN(input$)<L%
THEN input$=input$+CHR$(get%):VDU get
%
 2650 IF get%<>&D OR input$=""THEN 25
60
 2660 IF VAL(input$)<=max VDU 23,1;0;
0;0;0:=VAL(input$)
 2670 PRINT'"  Maximum possible value
 is ";max;
 2680 get%=INKEY(100)
 2690 GOTO 2540
```

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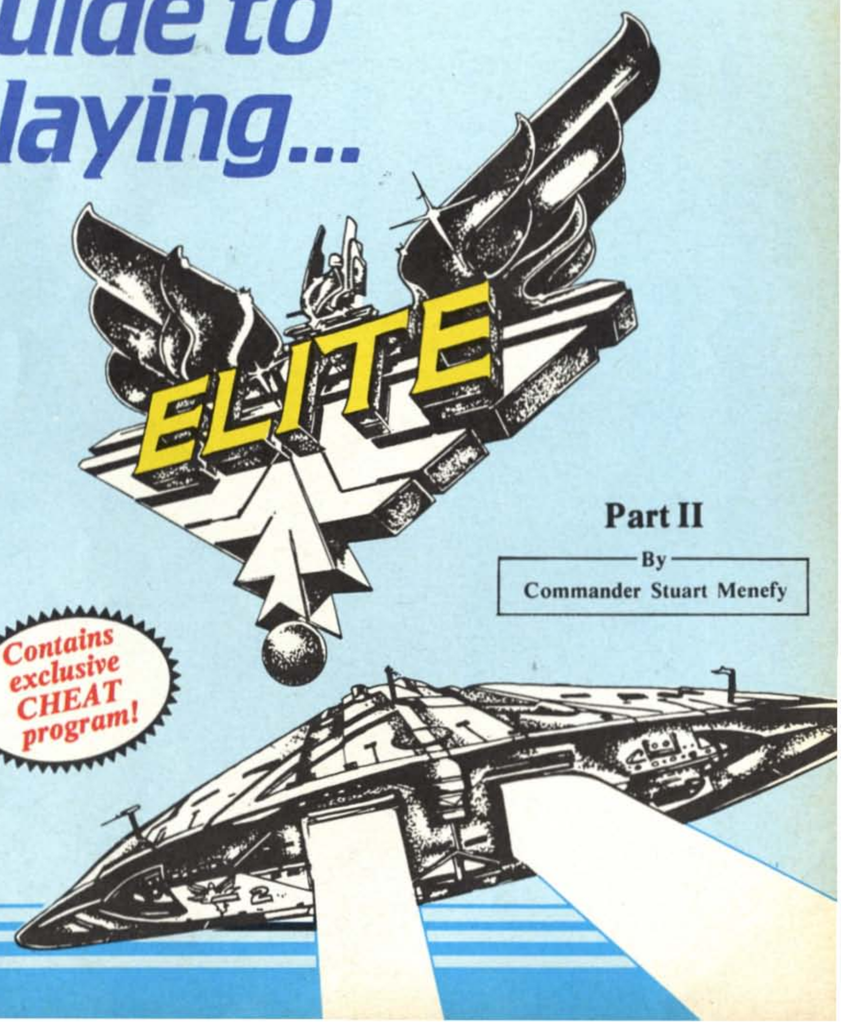
Guide to playing...



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Part II

By
Commander Stuart Menefy

How to cheat at Elite

DO you get shot up by pirates during your first hyperspace after leaving the docking station? Are you stuck at Harmless, with little chance of becoming Poor? If so, the program featured in this part of our Guide to Playing Elite, plus the accompanying notes, should be the secret weapon you have been yearning for.

Elite is probably the most popular game for the BBC Micro so far, yet there are still likely to be some people who have not yet managed to reach a level at which things start to become interesting – say getting chased by Vipers.

But help is at hand. Our exclusive program will give you a much superior starting position, such as a docking computer, better lasers, lashings of money and lots more. It works by manipulating Elite's data file, which although &100 bytes in length only makes use of &4C bytes. These are described in detail below.

There are few differences between the file created by the tape and disc versions, most relating to additional features available on disc, like missions and extra lasers.

Files may be transferred between the two freely. Additionally, although the military and mining lasers and naval energy unit are not normally available on tape, by using this program, or transferring a file from disc to tape, it is possible to obtain the same effects, although they will not be correctly listed on the status display. The same goes for the "cheat" versions of an energy unit, laser and large cargo bay, which are not correctly listed either, but function much better than their normal counterparts.

Similarly, it is possible to have more than four missiles. However this will result in corruption of the bottom line of the display.

The program allows any existing Elite file to be altered, or one entered from scratch. It is self-adapting to both the tape and disc filing systems.

When starting from scratch all values are set to those for Commander Jameson, including the quantity of food for sale. The program sets up the planet at which you start to be the one at which you arrive following galactic hyperspace, the exception to this being the initial position when you start at Lave.

When setting up missions your ship is either positioned just before meeting the Constrictor or at the first of the planets

```
et%=&59 OR get%=&4E
 1850 VDU get%
 1860 REPEAT get2%=GET AND &DF:UNTIL
get2%=&59 OR get2%=&4E OR get2%=&D
 1870 IF get2%<>&D THEN get%=get2%:VD
U &7F:GOTO 1850
 1880 VDU 8,8,32
 1890 =get%=&59
 1900 DEF FN_FILENAME
 1910 PRINTTAB(4,15)"Please enter fil
ename ";
 1920 VDU 23,1,1;0;0;0;
 1930 input$=""
 1940 REPEAT
 1950 REPEAT get%=GET:UNTIL (get%>&1F
 AND get%<&80) OR get%=&D
 1960 IF get%<>&7F THEN 1990
 1970 IF LEN(input$) input$=LEFT$(inp
ut$,LEN(input$)-1):VDU &7F
 1980 GOTO 2000
 1990 IF (LEN(input$)<10+(3*(file_sys
tem%=4))) AND (get%<>&D) THEN input$=
input$+CHR$(get%):VDU get%
 2000 UNTIL get%=&D AND input$<>""
 2010 VDU 23,1;0;0;0;0
 2020 IF file_system%=4 THEN PRINTTAB
(9,19)"Enter drive number ":=":"+STR$
(FN_INPUT(28,19,1,3,FALSE))+".E."+inp
ut$
 2030 =input$
 2040 DEF PROC_oscli($memory%)
 2050 PRINT
 2060 X%=memory% MOD &100
 2070 Y%=memory% DIV &100
 2080 CALL &FFF7
 2090 ENDPROC
 2100 DEF FN_MENU(number%)
 2110 VDU 23,1;0;0;0;0
 2120 CLS
 2130 FOR A%=0 TO 1:PRINTTAB((39-LEN(
menu$(number%,0)))DIV 2,A%)CHR$&8D;me
nu$(number%,0):NEXT A%
 2140 FOR A%=1 TO entries%(number%)
 2150 PRINTTAB(3,(A%*2)+1);CHR$129;A%
;".";CHR$134;menu$(number%,A%);
 2160 IF details$(number%,A%)<>"N"  P
RINTCHR$&82;"(";EVAL(details$(number%
,A%));")"
 2170 NEXT A%
 2180 PRINTTAB(0,21)"Enter which func
tion you require (1-";entries%(number
%);")"
 2190 PRINTTAB(3,22)"or ESCAPE to ";
 2200 IF number%=1 PRINT"re-save comm
ander";:main_menu%=TRUE ELSE PRINT"re
turn to main menu";
 2210 REPEAT get%=GET-&30:UNTIL get%>
0 AND get%<(entries%(number%)+1) AND
NOT((get%=7) AND (number%=1) AND lock
%)
 2220 PRINTTAB(0,(get%*2)+1);CHR$&88
```

Guide to playing...

```
190:file%!5=&6FA60490:file%?&F=1
 1690 IF ?file%=&A THEN file%!1=&6929
54D7:file%!5=&DE4D0821:file%?&F=2
 1700 lock%=(?file%=1 OR ?file%=&A)
 1710 RETURN
 1720 REM Re-save file, and error con
trol
 1730 IF INKEY(-1) OR ERR<>17 REPORT:
PRINT" at line ";ERL:GOTO 1800
 1740 IF main_menu%=FALSE THEN 160
 1750 CLS
 1760 main_menu%=FALSE
 1770 PRINTTAB(5,5)"ESCAPE to re-edit
 commander"
 1780 FOR A%=10 TO 11:PRINTTAB(11,A%)
CHR$&8D;"Save commander.":NEXT A%
 1790 CALL check%:PROC_oscli("SAVE "+
FN_FILENAME+" "+STR$~(file%)+" +100 0
 0")
 1800 *FX4
 1810 END
 1820 DEF FN_YES_NO
 1830 PRINT"? (Y/N)";CHR$&88;
 1840 REPEAT get%=GET AND &DF:UNTIL g
```

surrounded by Thargoids.

Note that on the first mission only military lasers (not cheat) can be used against the Constrictor, and in the second you are asked to go to the planet Birera. In these cases the galaxy which you are in is set by the program and cannot be altered.

All inputs from the program must be followed by Return. The numeric entries, such as quantity of cargo, are limited by the program to that acceptable by Elite, with the exception of money, as Basic's integer variables cannot hold the maximum possible value, and so is limited to only 429, 496, 728 Cr.

If you want to see what the maximum looks like, then insert the line:

```
1785 file%!9=-1
```

As Escape is used to switch between menus, Shift+Escape must be used to leave the program, if you do not wish to save a file.

The file, as it is saved, has no load or execution address, so I have listed all addresses as a hex offset from the start of the file.

File Structure

+00 Mission byte

This is only used on the disc version, and is altered whenever an event to do with a mission takes place. It starts off at 0, but once the first "Right on Commander" has been achieved and you are still in galaxy 1 or 2, things start to happen.

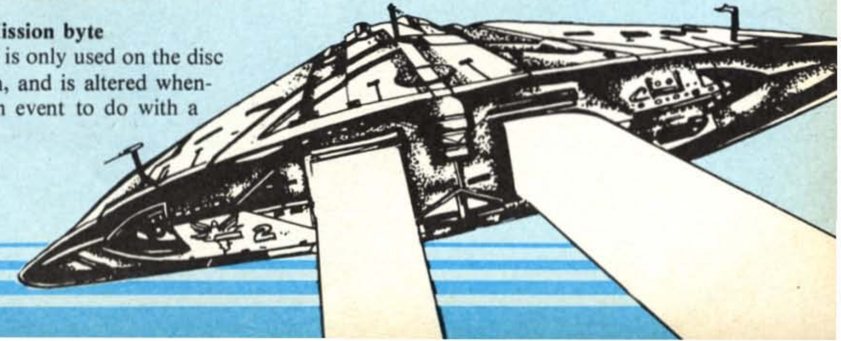
When you next dock a message is displayed asking you to chase after a new ship, the Constrictor, which has been stolen, and this byte is set to 1.

The chase then takes you to the other side of the galaxy, into galaxy 2 (if you were in galaxy 1), and eventually to a planet at which the ship has been sighted. It can then be destroyed, setting this byte to 2.

The other mission requires you to have had at least five "Right on Commanders", and to be in galaxy 3. Here you will be sent to a planet on the other side of the galaxy – they always are – and this byte is set to 6.

There you will be given an encoded message to take to a planet, and this byte will be set to &A. All of the planets in between will be surrounded by Thargoids, and when the final planet is reached you will receive an apology, a naval energy unit, and this byte will be set to &E.

Additionally, for both missions, &100 will be added to your tally of ships shot, which for the first mission should promote you to



Dangerous.

+01, 02 Planet number

Address of the current planet.

+03-08 Data on galaxy

Set up with data on the current galaxy.

+09-0C Amount of money

Store the amount of money earned. The value is first multiplied by 10 to get an integer which is stored in hex, but in reverse order to normal. For example, 200.3 Cr multiplied by 10 is 2003, or &7D3. This is stored as in bytes 09-0C as 00 00 07 D3.

It should be noted that the maximum value is 429, 496, 729.5 Cr, and if any more is "earned" wrap around occurs.

+0D Quantity of fuel

The amount of hyperspace fuel available. This is not limited to 7.0 light years, and may be up to 25.5 light years. The value stored is the number of light years multiplied by 10. For example, 21.3 light years multiplied by 10 is 213, or &D5.

+0E Check byte 1

The top bit of this is set if you have cheated in some way. For example, in the first versions of Elite if an attempt was made to buy a laser which was already present you were given some money and this bit was set. The lower bits are what versions have been used – 2 on tape, 4 and &20 on disc, and 8 on the Electron. Doubtless other versions exist.

+0F Galaxy number

Contains the galaxy number minus 1, so galaxy 4 is stored as 3.

+10-13 Laser type

Holds the type of laser at the front, back, left and right respectively. Laser types are stored as:

&00	None
&0F	Pulse laser
&8F	Beam laser
&32	Mining laser
&97	Military laser

+14, 15 Not used

On the current versions these bytes are always set to 0.

+16 Capacity of cargo bay

Holds the capacity of the cargo bay in tonnes, plus 2. A value of at least &25 is displayed as a large cargo bay.

+17-27 Quantity of cargo in cargo bay

These bytes contain the quantity of cargo in the cargo bay in order, so +17 is food, +18 textiles to +27 which is alien items, stored in normal hex bytes and not limited by the cargo bay size.

+28 ECM system present

Holds either 0 or &FF, depending on whether the ECM system is present or not.

+29 Fuel scoops

Holds either 0 or &FF, depending on whether fuel scoops are present or not.

+2A Energy bomb

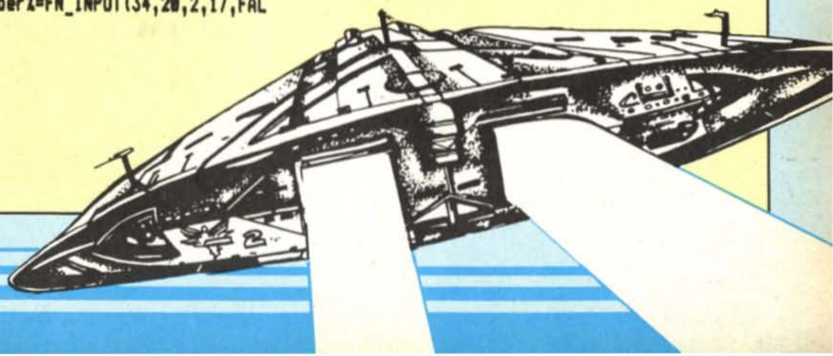
Will hold either 0 or &7F, depending on whether an energy bomb is present or not. If bit 7 is set it explodes on leaving the docking station.

+2B Energy unit type

Will hold a value dependant upon the type of energy unit present: 0 Not present; 1 Normal; 2 Naval (given as reward from second mission).

These are the normal values available. Others will result in a proportionally faster re-charge. However, values above three will

```
 1310 file%?&F=FN_INPUT(19,11,1,8,FAL
SE)-1
 1320 FOR A%=1 TO file%?&F+1:READ fil
e%!1,file%!5:NEXT A%
 1330 RETURN
 1340 DATA &5A4AAD14,&B7530248
 1350 DATA &B4945F60,&6FA60490
 1360 DATA &69296F5A,&DE4D0821
 1370 DATA &D2526763,&BD9A1042
 1380 DATA &A5A45D69,&7B352084
 1390 DATA &4B496663,&F66A4009
 1400 DATA &96925F6A,&EDD48012
 1410 DATA &2D25605E,&DBA90124
 1420 REM Set up Cargo
 1430 CLS
 1440 PRINTTAB(22)"Quantity Quantity"
 1450 PRINT" No.   Product   Unit as
Cargo for Sale"
 1460 FOR A%=1 TO 17
 1470 PRINTTAB(1);A%;".";TAB(5);cargo
$(A%);TAB(18);FN_UNIT;TAB(24);(file%?
(A%+&16));TAB(33);(file%?(A%+&34))
 1480 NEXT
 1490 VDU &86,&9D,&81:PRINT"   ESCAPE
 to return to main menu"
 1500 REPEAT
 1510 PRINTTAB(1,20)"Enter number of
product to alter"
 1520 number%=FN_INPUT(34,20,2,17,FAL
SE)
 1530 PRINTTAB(1,20)"Enter quantity o
f ";cargo$(number%);SPC(13);TAB(1,21)
"in cargo bay.";SPC(19)
 1540 PRINTTAB(23,number%+1);CHR$&88;
TAB(28,number%+1)CHR$&89
 1550 file%?(number%+&16)=FN_INPUT(14
,21,3,255,FALSE)
 1560 PRINTTAB(23,number%+1);" ";(fil
e%?(number%+&16));"  "
 1570 IF number%=17 THEN 1620
 1580 PRINTTAB(32,number%+1);CHR$&88;
TAB(36,number%+1)CHR$&89
 1590 PRINTTAB(1,21)"for sale at plan
et"
 1600 file%?(number%+&34)=FN_INPUT(20
,21,3,255,FALSE)
 1610 PRINTTAB(32,number%+1);" ";(fil
e%?(number%+&34));"  "
 1620 PRINTTAB(0,20);SPC(119);
 1630 UNTIL 0
 1640 DEF FN_UNIT
 1650 IF A%<14 THEN ="t" ELSE IF A%<1
6 THEN ="kg" ELSE IF A%=16 THEN ="g"
ELSE ="t"
 1660 REM Set Up Mission
 1670 ?file%=mission%(FN_MENU(8))
 1680 IF ?file%=1 THEN file%!1=&B4942
```



```
ad a"
  810 PRINTTAB(7,12)"previous command
er";
  820 IF NOT(FN_YES_NO) ENDPROC
  830 PROC_oscli("LOAD "+FN_FILENAME+
" "+STR$~(file%))
  840 FOR A%=0 TO 3:A%?&70=file%?(&C-
A%):NEXT A%
  850 IF ?file%=1 OR ?file%=6 OR ?fil
e%=&A THEN lock%=TRUE
  860 ENDPROC
  870 REM Alter Money
  880 CLS
  890 PRINTTAB(9,9)"Enter how much mo
ney"
  900 PRINTTAB(13,12)"you require."
  910 !&70=FN_INPUT(14,15,10,&CCCCCCC
,TRUE)*10
  920 FOR A%=0 TO 3:file%?(&C-A%)=A%?
&70:NEXT A%
  930 RETURN
  940 REM Alter Equipment
  950 REPEAT
  960 ON FN_MENU(2) GOSUB 980,1020,10
60,1070,1080,1090,1100,1110,1120
  970 UNTIL FALSE
  980 CLS:PRINTTAB(7,9)"Enter how muc
h hyperspace"
  990 PRINTTAB(13,12)"fuel you want."
 1000 file%?&D=FN_INPUT(17,15,4,25.5,
TRUE)*10
 1010 RETURN
 1020 CLS:PRINTTAB(10,9)"Enter cargo
bay size"
 1030 file%?&16=FN_INPUT(10,11,3,253,
FALSE)+2
 1040 RETURN
 1050 REM Toggle various bytes, and i
tems of eqipment
 1060 file%?&28=NOT file%?&28:RETURN
 1070 file%?&29=NOT file%?&29:RETURN
 1080 file%?&2E=NOT file%?&2E:RETURN
 1090 file%?&2A=file%?&2A EOR &7F:RET
URN
 1100 file%?&2B=FN_MENU(3)-1:RETURN
 1110 file%?&2C=NOT file%?&2C:RETURN
 1120 file%?&2D=NOT file%?&2D:RETURN
 1130 REM Alter Lasers
 1140 REPEAT file%?(FN_MENU(5)+&F)=la
ser%(FN_MENU(4)):UNTIL FALSE
 1150 REM Number of missiles
 1160 CLS
 1170 PRINTTAB(8,9)"Enter how many mi
ssiles"
 1180 PRINTTAB(13,12)"you require."
 1190 file%?&33=FN_INPUT(19,15,3,255,
FALSE)
 1200 RETURN
 1210 REM Alter combat rating
 1220 file%!&47=rating%(FN_MENU(6)) O
R (file%!&74 AND &FFFF0000)
 1230 RETURN
 1240 REM Alter legal status
 1250 file%?&34=status%(FN_MENU(7))
 1260 RETURN
 1270 REM Set Galaxy
 1280 CLS
 1290 RESTORE 1340
 1300 PRINTTAB(10,8)"Enter Galaxy Num
ber."
```

cause the energy to go down on its own, when no equipment is being used.

+2C Docking computer present

0 = present. &FF = absent.

+2D Galactic hyperspace present

0 = present. &FF = absent.

+2E Escape pod present

0 = present. &FF = absent.

+2F-32 Not used

On the current versions these bytes are always set to 0.

+33 Number of missiles.

This contains the number of missiles on board the ship. This is limited to 4 by the display. Although more are possible, and will function correctly, the display is not correctly maintained.

+34 Legal status

Contains the legal status and results in the following:

00	Clean.
01–49	Offender.
50+	Fugitive.

+35-45 Quantity of cargo for sale

The quantity of cargo for sale at the current planet, in the same way as cargo is stored in the cargo bay. However byte +45, quantity of alien items, can only hold the value 0.

+46 Price of cargo

Value from which the price of every item is calculated. Every item has three bytes of information, which are combined with this value, and a value from each planet, to give the required price.

+47, 48 Tally of kills

Total number of kills. + 48 holds the hi-byte and +47 the low-byte. These values give the Rating as follows:

0000-0007	Harmless
0008-000F	Mostly harmless
0010-001F	Poor
0020-003F	Average
0040-007F	Above average
0080-01FF	Competent
0200-09FF	Dangerous
0A00-18FF	Deadly
1900+	Elite

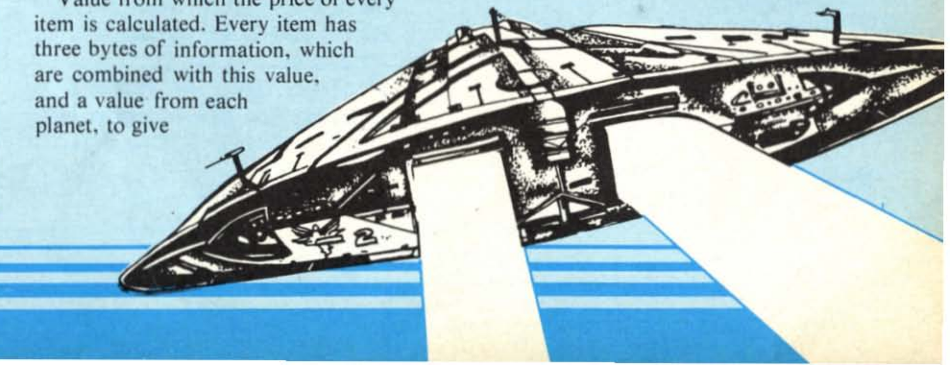
+49 Save byte

This byte starts at &80 and is divided by 2 on every save. After 8 saves it will contain 0.

+4A, 4B Check bytes

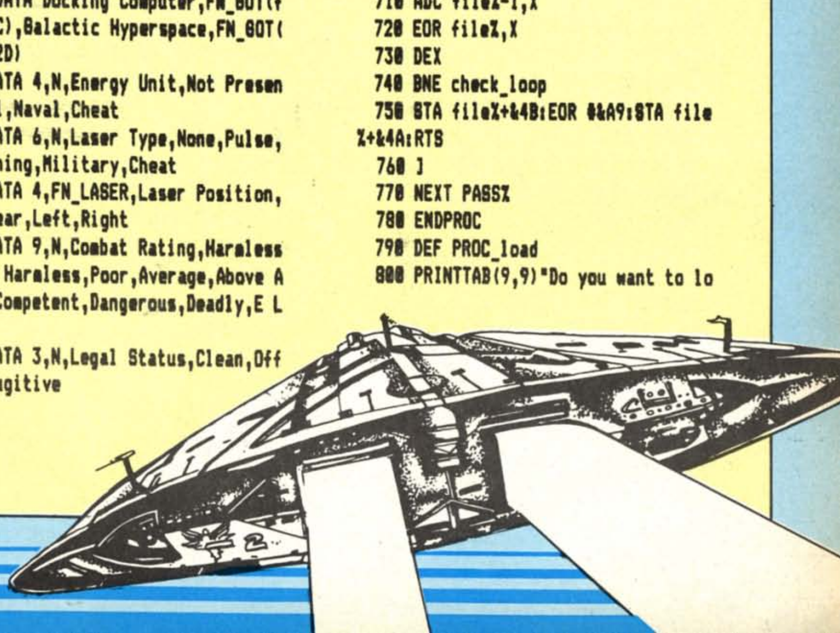
Check-sum on the file – the routine used is given in PROC_assemble. The byte at +4B must be correct upon loading, otherwise the computer will crash by going into an endless loop.

The byte at +4A is a second check which will not crash the computer if incorrect, but will set the top bit of +0E.



Listing I

```
   10 REM ##################
   20 REM #  ELITE CHEAT   #
   30 REM ##################
   40 REM #       By       #
   50 REM # Stuart Menefy  #
   60 REM #      (C)       #
   70 REM #   The Micro    #
   80 REM #     User       #
   90 REM ##################
  100 MODE 7
  110 PROC_screen
  120 PROC_init
  130 PROC_assemble
  140 PROC_load
  150 ON ERROR GOTO 1730
  160 REPEAT
  170 ON FN_MENU(1) GOSUB 880,950,114
0,1160,1220,1250,1280,1430,1670
  180 UNTIL FALSE
  190 DEF PROC_screen
  200 FOR A%=0 TO 1:VDU 31,0,A%,134,1
57,129,141,31,15,A%:PRINT"Elite Cheat
":NEXT A%
  210 VDU 28,0,24,39,2
  220 VDU 23,1;0;0;0;0
  230 ENDPROC
  240 DEF PROC_init
  250 @%=0
  260 *FX4 1
  270 DIM memory% 40,file% &100,check
% 100
  280 DIM entries%(8),menu$(8,9),deta
ils$(8,9),laser%(6),rating%(9),status
%(3),mission%(5),cargo$(17)
  290 X%=&70:Y%=0:A%=0:file_system%=U
SR(&FFDA) AND &F:REM Read which filin
g system is in use
  300 REM Set file to commander James
on
  310 FOR A%=0 TO &FF STEP 4:A%!file%
=0:NEXT A%
  320 !&70=1E3:file%!&B=&446E003:file
%?&10=&F:file%?&16=&16:file%?&33=3
  330 file%!1=&5A4AAD14:file%!5=&B753
0248
  340 lock%=FALSE
  350 REM Read in data
  360 FOR A%=1 TO 6:READ laser%(A%):N
EXT A%
  370 DATA 0,&F,&8F,&32,&97,&FF
  380 FOR A%=1 TO 9:READ rating%(A%):
NEXT A%
  390 DATA 0,8,&10,&20,&40,&80,&200,&
A00,&1900
  400 FOR A%=1 TO 3:READ status%(A%):
NEXT A%
  410 DATA 0,1,50
  420 FOR A%=1 TO 5:READ mission%(A%)
:NEXT A%
  430 DATA 0,1,2,&A,&E
  440 FOR A%=1 TO 8
  450 READ entries%(A%),details$
  460 FOR B%=0 TO entries%(A%)
  470 READ menu$(A%,B%)
  480 IF details$="I" AND B% READ det
ails$(A%,B%) ELSE IF details$="N" THE
N details$(A%,B%)="N" ELSE details$(A
%,B%)=details$
  490 NEXT B%,A%
  500 IF file_system%<>4 THEN entries
%(1)=7
  510 FOR A%=1 TO 17:READ cargo$(A%),
file%?(A%+&34):NEXT A%
  520 ENDPROC
  530 DATA 9,I,Main Menu,Set Money,!&
70/10,Alter Equipment,N,Alter Lasers,
N,Set Number of Missiles,file%?&33,Se
t Rating,FN_RATING,Set Status,FN_STAT
US,Set Galaxy,file%?&F+1,Alter Cargo,
N,Set Mission,FN_MISSION
  540 DATA 9,I,Alter Equipment,Fuel,(
file%?&D)/10,Cargo Bay Size,(file%?&1
6)-2,ECM System,FN_GOT(file%?&28),Fue
l Scoops,FN_GOT(file%?&29),Escape Cap
sule,FN_GOT(file%?&2E),Energy Bomb,FN
_GOT(file%?&2A),Energy Unit,FN_ENERGY
  550  DATA Docking Computer,FN_GOT(f
ile%?&2C),Galactic Hyperspace,FN_GOT(
file%?&2D)
  560 DATA 4,N,Energy Unit,Not Presen
t,Normal,Naval,Cheat
  570 DATA 6,N,Laser Type,None,Pulse,
Beam,Mining,Military,Cheat
  580 DATA 4,FN_LASER,Laser Position,
Front,Rear,Left,Right
  590 DATA 9,N,Combat Rating,Harmless
,Mostly Harmless,Poor,Average,Above A
verage,Competent,Dangerous,Deadly,E L
 I T E
  600 DATA 3,N,Legal Status,Clean,Off
ender,Fugitive
  610 DATA 5,N,Mission Menu,Before Mi
ssion 1,During mission 1,After missio
n 1,During mission 2,After mission 2
  620 DATA Food,&10,Textiles,&F,Radio
actives,&11,Slaves,0,Liquor/Wines,3,L
uxuries,&1C,Narcotics,&E,Computers,0,
Machinery,0,Alloys,&A,Firearms,0,Furs
,&11,Minerals,&3A,Gold,7,Platinum,9,G
em-Stones,8,Alien Items,0
  630 DEF PROC_assemble
  640 FOR PASS%=0 TO 2 STEP 2
  650 P%=check%
  660 [OPT PASS%
  670 LDX #&49
  680 LDA #&49
  690 CLC
  700 .check_loop
  710 ADC file%-1,X
  720 EOR file%,X
  730 DEX
  740 BNE check_loop
  750 STA file%+&4B:EOR #&A9:STA file
%+&4A:RTS
  760 ]
  770 NEXT PASS%
  780 ENDPROC
  790 DEF PROC_load
  800 PRINTTAB(9,9)"Do you want to lo
```



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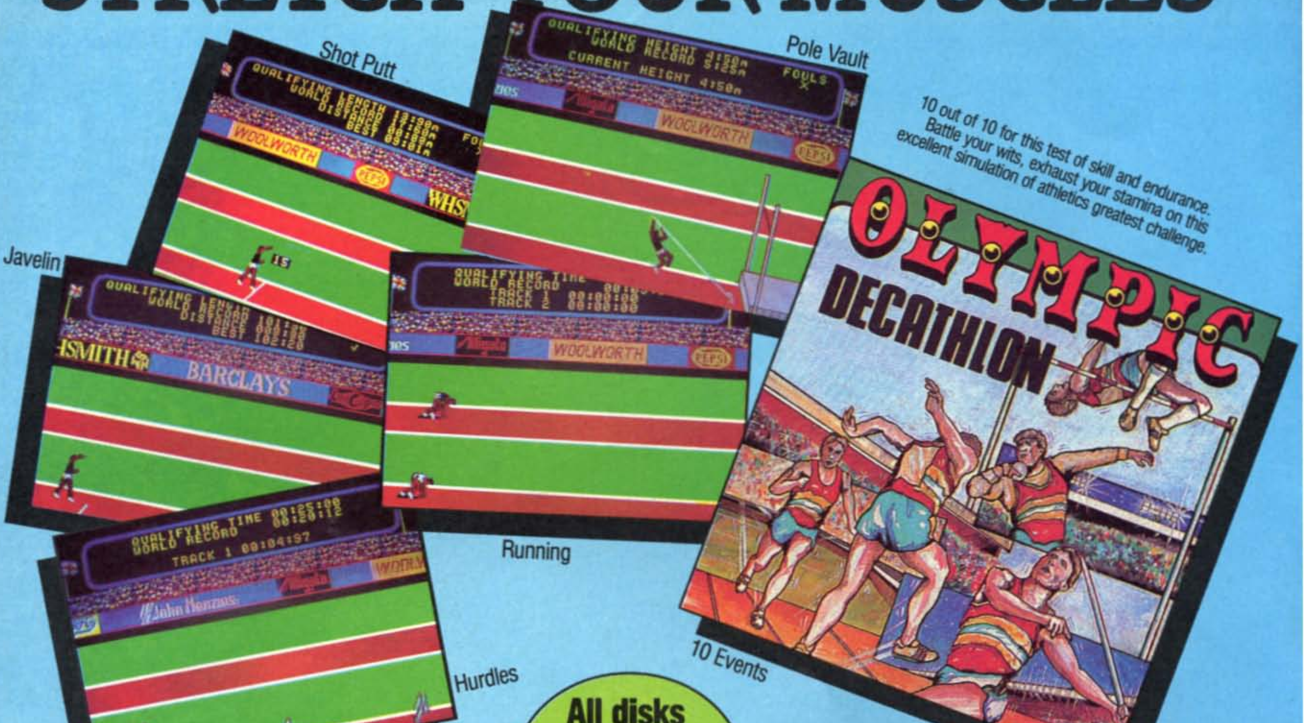
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Pole Vault
Javelin
Running
Hurdles
10 Events
QUALIFYING LENGTH
WORLD RECORD
DISTANCE
BEST
QUALIFYING HEIGHT 4:50m
WORLD RECORD 5:25m
CURRENT HEIGHT 4:50m
FOULS
QUALIFYING TIME
WORLD RECORD
TRACK 1 00:00:00
TRACK 2 00:00:00
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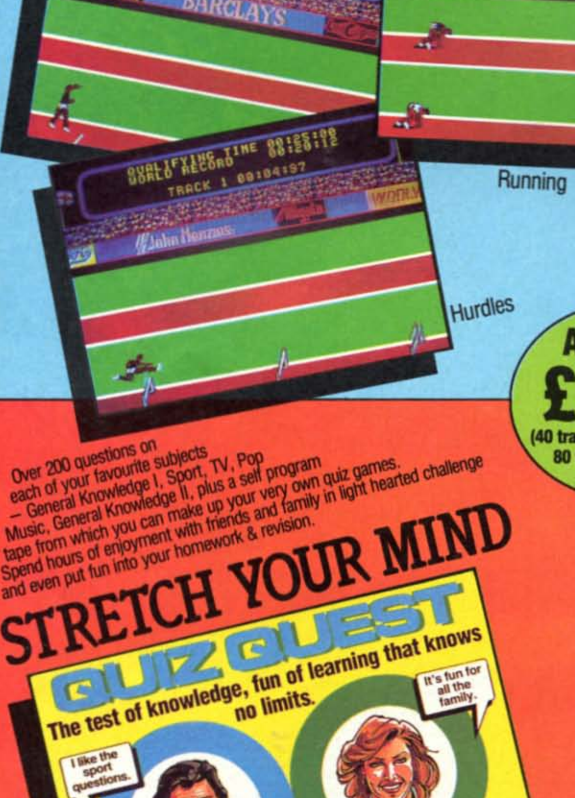
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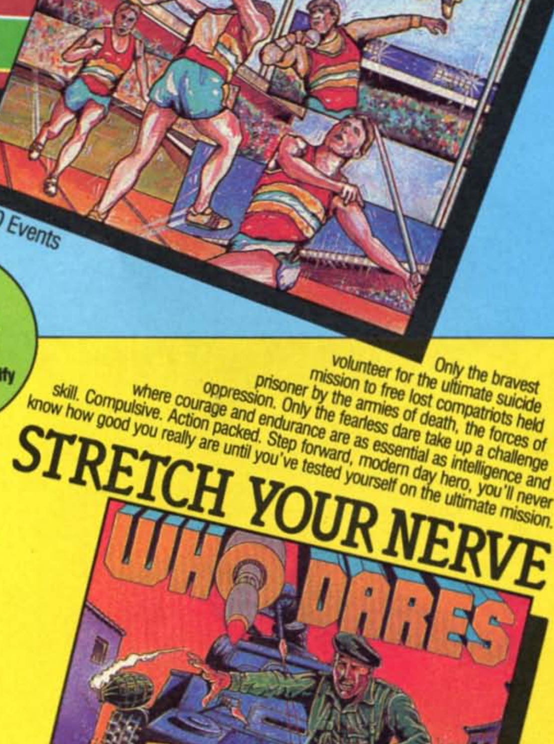
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WHAT IS DATABASE?

It is a FILE containing RECORDS , each record consists of a number of FIELDS containing the information - an analogy can be drawn with a card index in which a box of cards is the file, each card is a record and each line on the card is a field.

SPECIFICATION

1) Random Access	- disc based, single or dual drives
2) File Size	- max 65,000 records
3) Record Size	- up to 2048 characters and 200 fields
4) Field Size	- up to 254 characters
5) Holds	- approx 1200 ADDRESS records per 100k
6) Search	- 5 search fields using powerful options
7) Sort	- 500 records on 3 fields in 60 seconds.

SYSTEM FEATURES

- *CALCULATE - using any valid expression
- *PRINTOUT - Powerful options
- *REDEFINE - Titles, fields etc.
- *TRANSFER - From one file to another
- *GLOBAL ENTRY - of repetitive data
- *SEARCH LISTS - Allow creation of sub Databases within main Database
- *SPOOLER - enables you to create spooled files that are compatible with Wordwise, View etc.
- *INPUT - is a routine included on the disc which will allow you to write your own utilities for accessing your data. Many of the programs on the utilities disc were written using this procedure
- *TUBE - compatible with the 6502 second processor
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- *Beta-Base compatible

This is the first module in an integrated accounting suite of programs written to be used and not simply to please an accountant. This module contains an INVOICE and DELIVERY NOTE program with 80 column input and screen editing, you see what will be printed before committing yourself. Customer details can be automatically placed in a Beta-Base compatible file for use as a mailing list.

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Future modules will be STATEMENT and ACCOUNTS RECEIVABLE, STOCK CONTROL, ACCOUNTS PAYABLE and NOMINAL LEDGER. All relative files are compatible with CLARES Beta-Base which can be used to manipulate the files as required. The Beta-Base Utilities Disc provides Mail-Merge facilities using the customer list.

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Challenger your BBC a megabyte

By ROBIN NIXON

THE latest product from Opus combines a 5.25in double sided 40/80 track disc drive, a double density disc interface and a fast solid state RAM disc in a single unit, the Challenger DDOS system.

This unit, much the same size as a standard double disc drive, plugs neatly into the 1MHz bus. With 256k built-in RAM – which can be expanded up to 512k – plus the double sided, double density 80 track drive, the Challenger can upgrade the memory capacity of your BBC Micro to 1 megabyte.

Despite this, PAGE remains at &E00, the same as with a cassette filing system. This is because Challenger has its own RAM workspace.

Let's concentrate on the disc part first. The 40/80 track mechanism is fully software controllable. The way it works is by double stepping the 80 track mechanism when accessing a 40 track disc. Detection of whether a disc is 40 or 80 track can be set to automatic, so you can always ensure that your discs are readable.

The Challenger can also tell the difference between single and double density formats. As you know, double density is a way of cramming almost twice the information on to a disc. However to make the best use of the Challenger you must ensure the discs you use are double density quality, as single density discs are not guaranteed to work in a double density format.

Of course it's not just a versatile disc drive, Opus also provides you with 256k of RAM to play with. This RAM thinks it's a disc and the DDOS treats it as drive 4. If you have the 512k version you get a drive 5 too.

The RAM disc allocates sectors to files so that errors such as "can't extend" are eliminated. In other words, it is a simple matter to use the RAM disc for most of your random access files then copy completed files from the RAM to a floppy disc.

Having said that it's drive 4, you can reconfigure the first RAM disc as drive 0, thus enabling you to run software that insists on using drive 0.

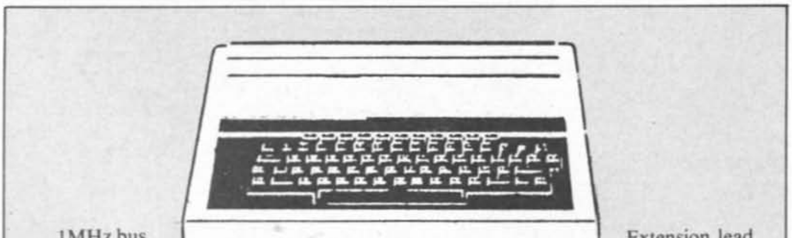


Figure I: A fully expanded Challenger System

One of its main uses will be the copying into RAM of disc files which are too big to fit into the processor's memory. There they can be worked on at 10 times the speed of a disc drive. Once updated the files can be transferred back to disc.

You might imagine that having all this extra memory floating about in the two different formats of disc and RAM could cause data handling to become rather complicated.

Not so. Challenger's solution is to divide the system's memory – disc or RAM – into volumes, each having roughly the same memory as a standard single density 40 track disc. You can see the idea in Figure II. There are also a number of new DFS commands to handle these volumes. These are explained in detail in the panel on the right.

If you already have a standard DFS in your micro and wish to use it, the only effective way of doing so is to unplug the Challenger from the 1MHz bus. However other drives can easily be connected to the first, as Figure I shows.

The Challenger appears to be fairly upward compatible with the standard DFS. Most of my discs of various formats will work on it, including commercial and protected discs (with the exception of Elite, which is a shame).

Having said that, there will inevitably

gives Micro boost

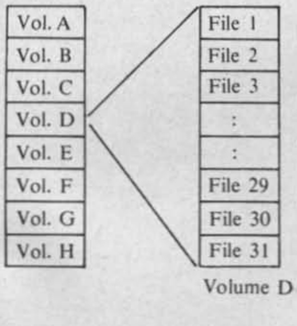
be more and more exceptions, owing to the ever-evolving art of software protection.

Although Challenger is a flexible and versatile system for handling large amounts of data I think it unlikely that I would use it myself for two main reasons:

- I rarely handle large amounts of data.
- If I did, I could buy more than 130 floppy discs (13 megabytes) for the same price as a Challenger.

However for the serious user Challenger could make file handling far easier and a good sight faster to use than a standard DFS, as well as bringing a permanent end to "is it 40 or 80 track, single or double density?" problems.

In addition, all the workspace used by a standard DFS is reclaimed and made available to the user by Challenger.



Each volume is the size of a standard 40 track single density disc and contains a catalogue of up to 31 files.

Figure II: How memory is divided into volumes

THE * COMMANDS

***4080**	Allows you to choose the format of the disc you wish to use.
***4080 ON**	Allows only 40 track discs to be used in an 80 track drive.
***4080 OFF**	Allows 40 track discs to be used in a 40 track drive and 80 track discs to be used in an 80 track drive.
***4080 AUTO**	Automatically works out the format of a disc for you and allows either 40 or 80 track discs to be used in an 80 track drive.
***CAT**	As with the standard DFS except that you can specify a volume as well as a drive.
***COMPACT**	As *CAT.
***DENSITY**	Allows the disc interface to be configured so that either single density or double density discs are readable.
***DENSITY AUTO**	As *DENSITY except that selection is automatic.
***DRIVE**	Allows you to specify a volume as well as the drive.
***FDCSTAT**	Returns the value of any DDOS errors.
***FORMAT**	A very versatile command which allows you to choose between 40/80 track and single/double density.
***MAP**	Displays a map of the specified volume, showing the tracks and sectors occupied by files.
***MCOPY**	Files on a source volume are copied to a target volume. Similar to *BACKUP.
***SROM**	Will save to disc the contents of a specified sideways ROM.
***STAT**	Displays the size of a volume plus its remaining space.
***TAPEDISC**	Automatically transfers a file from tape to disc in the specified volume and drive.
***VERIFY**	Verifies a disc.
***VOLGEN**	Allows you to change the amount of space allocated to a volume on double density discs.
***XCAT**	Catalogues all the volumes on a specified drive.
***CONFIG**	Configures a physical drive to become a logical drive – just as VDU 19,1,4,0,0,0 sets physical colour 1 (red) to logical colour 4 (blue) – that is colour 1 becomes blue, so *CONFIG sets a specified drive to "think" it is another.
***OPT 6**	Controls the density assumed by the filing system.
***OPT 7**	Sets up the drive's step rate.
***OPT 8**	Controls the 40-80 track mechanism.
***OPT 9**	Specifies the socket number of the sideways ROM which is to be read by the *SAVE command when saving data in the address range &8000 to &BFFF.

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1

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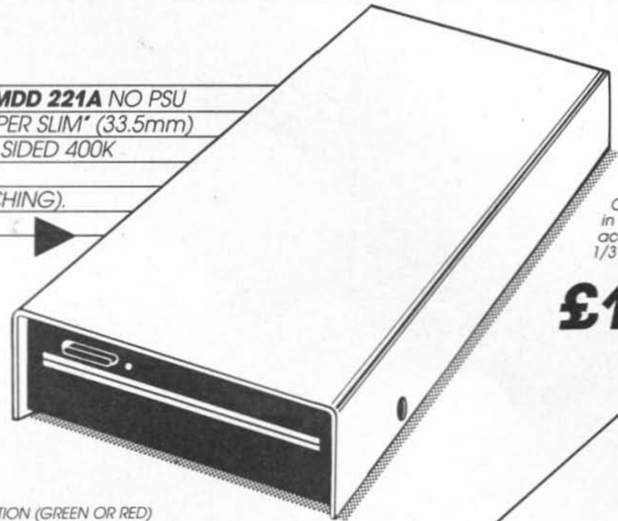

SPECIFICATIONS:

80 track double sided disc drive. 40/80 track switching with dual colour LED. Capacity 400K in single density, operates in double density. Direct drive, track to track access 3 ms in 96 TPI mode. Dimensions:- 1/3 standard height, only 33.5mm.

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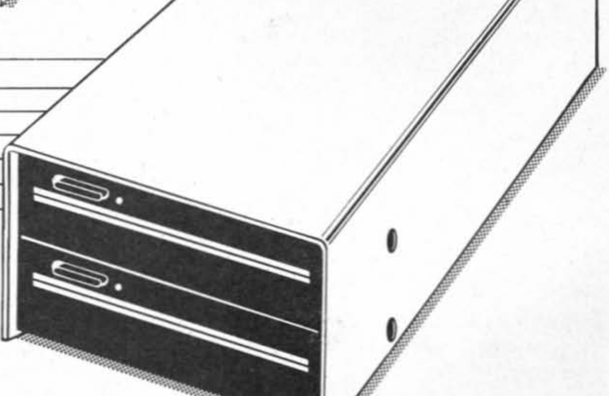
80 TRACK MODE: ________ LED RED
POWER ON: ________ HALF-ILLUMINATION (GREEN OR RED)
DRIVE SELECTED: ________ FULL-ILLUMINATION (GREEN OR RED)

2

CANON DUAL MDD 221A
WITH PSU



SPECIFICATIONS:

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3

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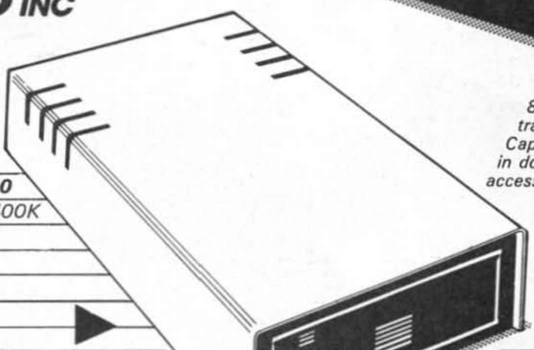
(40/80 TRACK SWITCHING)



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Vector 1 & 2	***£23***	

5

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**This test requires an oscilloscope and alignment disc.*

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6

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- *Comprehensive instruction manual.*

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"Well produced and technically good futuristic combat flight simulation featuring some of the best and smoothest 3D graphics I've come across on the Beeb." –

Computer Trade Weekly

RATED 8 OUT OF 10 FOR QUALITY, GRAPHICS, PLAYABILITY & VALUE!

More than 'just' a very fast full-flight Simulator 'Phantom Combat' offers the excitement and energy of 1500 mph air to air combat in high resolution 3D colour graphics. This 100% machine code package has been written by a military flight simulator software engineer together with the B.A. captain who wrote the best selling '747' simulator for Doctor Soft.

A SIMULATOR INSIDE A SIMULATOR

In one of the training modes (formation mode: FORM) it is **actually possible to fly the Phanton AND control the Enemy aircraft** which can be clearly seen flying in 3D outside your fully equipped cockpit. Alternatively, a friend can pilot the amet (on separate keys) while you attack.

THE ADVERSARY

Now, at last, enemy aircraft are NOT shown as arcade 'sprites', **they are computer drawn, navigated and 'flown' at a smooth 15 Frames per second**. The delta outlines reflect Soviet Mig 21 (Fishbed)/9Su 15 (Flagon) performance. In combat mode (CBAT) they fight back, intelligent and dangerous.

INSIDE

Instrumentation is comprehensive with a wealth of clear and precise displays, **featuring both analogue and digital readouts**, eg speed in knots as shown on a dial AND digitally, with a separate Mach number display; radar computed target range altitude and bearing shown; target pointer and gunsight; military 'Tacan' navigation (Tactical air navigation) etc.

'OUTSIDE'

External views includes Horizon, other aircraft, a network of ground detail points, **separate landing runways and animated 'strobe' approach lighting**. NO 'chunky' pixels, all objects are drawn in fine, high resolution coloured lines. **The view is recomputed and redrawn 15 times every second.**

AIR TO AIR COMBAT

Warning There are no 'lives' but your single one, your score is zeroed and the program restarted if you are shot down or crash. This motivates you to try and 'bring home' a damaged aircraft. May different forms of damage can occur. Most are survivable, eg a gear up runway landing if smooth enough. **If you can't land, use the EJECTION seat and survive.**

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MU2

Harrier hits its target

MIRRORSOFT
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Can you meet the ultimate challenge?
Full V/STOL flight and battle simulation
BBC B OS 1.0+/Electron

THERE are so many aspects to **Strike Force Harrier** from Mirrorsoft that it is difficult to know where to begin.

At it's simplest the game is a flight simulator for the Harrier jump jet.

However it isn't a simple matter to fly a real Harrier, and this is faithfully reproduced in the game. There is a choice between using the keyboard or a joystick.

Unfortunately, it seems that in implementing this the joystick is being made to work in a switched mode rather than as a progressive analogue device. Control in roll is acceptable, but pitch is appalling.

About half the keyboard is used for various types of systems switches. Some are fairly straightforward, such as flaps and undercarriage, but others become more necessary as you get deeper into the game.

There are infra-red flares to decoy enemy heat-seeking missiles, and chaff dispensers, which will fool enemy radar.

You can toggle the multi-function display to show aircraft or weapon systems status, and select between various different sorts of head up display (HUD).

While the bottom half of the screen shows the instruments in the cockpit, the top half shows the view through the front of the canopy, complete with canopy arch.

Superimposed on this is the HUD, which has a digital readout of heading, height and pitch angle, and pointer displays of airspeed and vertical speed. In the middle is the roll indicator and gunsight.

However the display can be changed to homing mode, missile sight, or bomb sight. It is very realistic, and the latter, with its computer predicted point of impact, is especially so.

The dividing line in the game is 12,000 feet or so, for there is a thin layer of cloud at this altitude.

Climbing through it is very authentic. You stop using ground features, go on to instruments, and then climb into the clear sky above. There are small bundles of fluffy clouds, and hiding among them, the enemy jets.

Their location can be determined from the air attack radar, which also displays whether they are above or below you, while missile acquisition is displayed by a line on the HUD to the target.

Below the cloud base you become a mud-mover, as ground attack pilots call themselves. There are tanks and SAM (surface to air missile) sites to destroy, with guns or bombs.

Just as the enemy fighters can shoot you down if you don't get them first, so, too, will the ground launched missiles, if you aren't careful.

Just in case you believe the answer is stay low, there are fairly solid hills for the unwary to run into.

Having gained proficiency in flying, and then combat, it is time to embark on the mission.

The aim is to destroy the enemy HQ. However it is well out of range, and so the intervening territory must be cleared of enemy tanks and SAMs.

Then you can bring up your supporting ground forces, who will refuel and rearm you.

To assist planning this caterpillar-like movement the game is supplied with a chart – just a piece of paper divided into squares.

You, as pilot, must reconnoitre your route, using the information displayed on the most impressive item of cockpit display, the FOFTAC Map/Radar. I suspect it means Friend or Foe Tactical Map and Radar.

I also suspect that real Harrier pilots wished they had something as comprehensive as this.

To summarise, the game has almost everything. It is a combination of flight simulator, "shoot and blast them" and strategy game.

It even has a very well written and comprehensive manual. Unfortunately, the whole package doesn't quite come off.

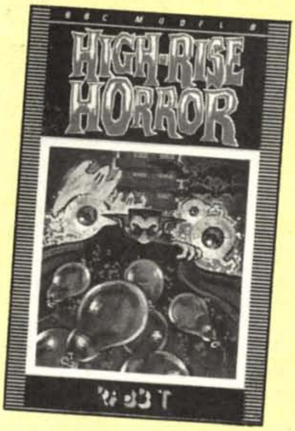
The penalty of all the coding needed to provide the facilities is a low resolution graphics screen, and all-or-nothing controls.

It's a natural contender for re-writing for the BBC+ or the Second Processor.

This'll not convert you if you don't like flight simulators, but if you do, buy it.

Robert Elwell

Be a ghost hunter



IN **High-Rise Horror** from Rabbit Software now marketed by Virgin Games, you take the part of Vladimir the Ghost Hunter.

The story is that Count Dracula has set up residence in a block of flats filled with an assortment of unpleasant things including ghosties, bloodsucking bats, eyeballs and shocking spiders.

The Residents' Association has hired you to eliminate the morbid inhabitants using your supply of balloons, which makes a change from the usual blast-o-matic zap gun.

If anything collides with a balloon the critter dies and you get points depending on what was killed and when.

Although you have a limitless supply of balloons you can only have one in the air at once. They take a little time to blow up, so there's quite a bit of skill in judging when to blow.

The opening screen consists of several stripes with gaps in them and you must walk through the aisles in between to reach the exit.

The next screen is virtually identical except for meaner opponents.

You must progress through the screens until you reach Dracula. Unfortunately, I've not done this and am not fired with enthusiasm to do so.

The game has some nice touches, such as the fancy lettering used throughout, as well as joystick compatibility. Presentation is fair with all the characters moving smoothly but with little animation.

The instructions are adequate and include a screen photo. Sound is implemented well with single note tunes accompanying the strings of bangs and crashes as you play.

However one particular niggle is the long wait between lives, which spoils the continuity.

The game is nice and fast requiring good responses, but it still isn't challenging enough to the player who's used to the cartoon graphics, three dimensions and multi-track sound available today.

It's a nicely finished game with a simple theme requiring quick reflexes.

Phil Tudor

A model for education packages

INTRODUCTORY Genetics, from Garland, is designed for pupils aged 13 to 16 who are studying CSE and "O"-level biology.

The software is designed to improve their understanding of elementary concepts in genetics.

The package contains eight programs in three sections.

Sex Determination examines how male and female offspring are produced during reproduction.

Dominance and Codominance investigates the results of any cross for single factor inheritance controlled by two elleles.

Inheritance of Blood Groups displays the results of any cross from the user-selected genotypes based on A, B and O alleles.

The whole package is menu-driven, enabling you to start at any point for practice or revision.

Each section follows a similar format: an optional introductory text is followed by TRUE/FALSE questions to test understanding; incorrect answers are explained and retested, and the program will not continue until all are answered correctly.

Double-height teletext characters are used throughout, with colour coding to emphasise key words in the clear and concise information.

Extensive use is made of graphics animation, histograms and line graphs to enhance a most impressive product.

Each section is divided into a number of compact and self-contained learning units based on sound educational methodology.

Exposition of information precedes appropriate examples. This is followed by consolidation of the concepts learnt by the use of simulations, games and tests based on randomly-generated data.

The programs can be used for computer-assisted learning by an individual, for a small group working by consensus, or as an interactive visual aid for a class lesson.

All necessary operating instructions are on-screen.

The error-trapping routines are superb – mistakes are pointed out and clearly explained.

These are certainly some of the best I have seen, coping with even the most ludicrous possibilities devised by the adolescent mind!

An eight-page booklet contains useful background information, full software description and objectives for each program – a model for all other educational suppliers to emulate.

This package has considerable potential.

It has applications in many areas of the curriculum. For example, the sections on random sampling, probability and graphical presentation would prove useful for students of statistics.

It is a thorough, educationally-sound, well-written, interesting classroom asset that represents excellent value.

Jim McHugh

Smooth, spritely

ARE you tired of being pushed into the role of super hero, you know the "one man against an entire alien invasion" scenario?

Does your ego shrink as yet another burst of laser fire shrivels your main weapon? Well perhaps **Deathstar** from Superior Software is for you.

The basic plot remains the same, but there are no reckless acts of heroism here. You are the pilot of a space ship that traverses a colourful scene, in the early stages shooting harmless asteroids.

Your task is to mine and collect a full load of 24 crystals that are discharged from the asteroids.

Two types of lesser aliens hinder you in this task – workers who steal your mined crystals and warriors who take the odd pot shot at you.

Eventually the arch villain of the hour, the Deathstar, assembles itself and – this is the unheroic bit – you must run away from it as fast as your little ion drives can carry you.

At the same time you must let loose your load of crystals, now transformed into death bombs, until hopefully, piece by piece the Deathstar is destroyed.

DeathStar
BBC MICRO
SUPERIOR SOFTWARE

If you can accomplish this you are transported via a bonus screen to the next level, where the asteroids get fewer, the workers and warriors are more numerous and intelligent, and the Deathstar needs more bombs to kill it.

The game is a good conversion of a minor arcade hit. The graphics involve the use of large, colourful sprites which, along with the background, are smoothly animated.

Add to this some exciting sounds and you have as good a copy of the original as Planetoid was of Defender.

Peter Clifton

Go 3D with DD

THE only thing that ever gave me second thoughts about the BBC Micro in favour of the Spectrum was Psion's Vu3D graphics package. Up to now there has been no really good equivalent – the nearest thing has been Micad3, but that is part of a package costing over £20.

Now, however, we have just as good a program for the BBC Micro and at only £8.95 for the cassette version.

Interactive 3D from Design Dynamics allows you to construct 3D wireframe drawings which can be viewed in either plain first angle orthographic projection or in perspective – one screen displays both together, very useful.

Any of the orthographic views, front and side elevations and plan, can be seen individually, and the perspective view can be rotated to be seen from any angle.

There are some clever points to this program. You can zoom into or out of whichever view is on screen in order to do some fine point positioning.

Vu3D on the Spectrum rotates the object very quickly indeed, making full use of its 48k. Interactive 3D is slower, but allows quick positioning by a simple trick – the three axes X, Y and Z can be displayed at any time and you can rotate them alone very quickly.

When they are in the correct alignment a function key press causes the full object to be redrawn in the new attitude.

The program is great fun. It is claimed to be very user friendly but I would disagree somewhat.

No system of 3D drawing is child's play, it requires thought and patience. This program uses the cursor keys cleverly to allow you to reach a desired point anywhere on the object very quickly. Pressing f0 acquires it and it can then be manipulated positively or negatively in any of the three axes by keys f4-f9.

This requires a bit of getting used to, but is effective when you get the hang of it.

Extensive use is made of all possible function key combinations and the result is a fascinating program which, after a bit of hard work at first, fully lives up to the claims made for it.

Terry Hallard

Repton revisited to good effect

IN the summer of 1985 Superior Software launched Repton, which very quickly established itself as a new style of BBC Micro arcade adventure. They must have been pleased with its success, as within six months they've released **Repton 2**, bigger and allegedly more difficult than its predecessor.

For those of you unfamiliar with the original, your task was to guide hero Repton through a series of twisting underground caverns in the search for diamonds. In your quest you were up against the perils of falling boulders and evil lizards.

In Repton 2, the idea of collecting diamonds is continued, but now there are a mere 1,634 of them. And if those aren't enough to keep you busy, in addition you have to amass 4,744 sections of earth, see off 18 monsters and collect and fit together 42 pieces of jigsaw to reveal a message.

Only when you have achieved the lot can you claim to have solved this mammoth puzzle. Because that's really what the program is – a series of separate puzzles each to be solved by determining the correct routes to collect the items you require.

The game has 16 different caverns, four more than the earlier version, all linked by transporters. The transporter's purpose is to carry you to other screens but, they can only be used once.

This new version has all the fantastic colourful features of the original and many more including eggs, meteors, spirits, monsters, skulls, safes and keys.

A rock or egg will fall if it is left unsupported as you pass through the caverns and you finish up blocking routes that originally were open. And a falling rock will crush you if you're not nimble enough to get out of its way.

When an egg falls it breaks and a monster emerges. Contact with it will be fatal, as will touching any of the spirits, meteors or skulls that block your path around the maze.

Some diamonds are hidden in safes which can only be opened by finding the appropriate keys.

The whole screen acts as a window over the area of the cavern that you happen to be in at any given moment, so that you can see only a small part. As you move, the view through the window scrolls smoothly in the appropriate direction in response to either keyboard or joystick.

I haven't completed even 10 per cent of this adventure, but I relish the prospect of finding my way further into it.

Sounds and music are optional, and the graphics are superb. For Repton addicts, this is an opportunity to carry on where the other left off. For

REPTON 2
BBC MICRO
SUPERIOR SOFTWARE
£9.95

those not yet initiated into the fan club, this is your opportunity to make up for lost time.

And anyway, if there isn't enough in the game to tempt you, there's a £200 prize for one of the first 100 to solve the puzzle.

Nice one Superior Software, this "continuing" idea could catch on. How about Death Star Revisited?

David Andrews

Gateway to electronics and logic

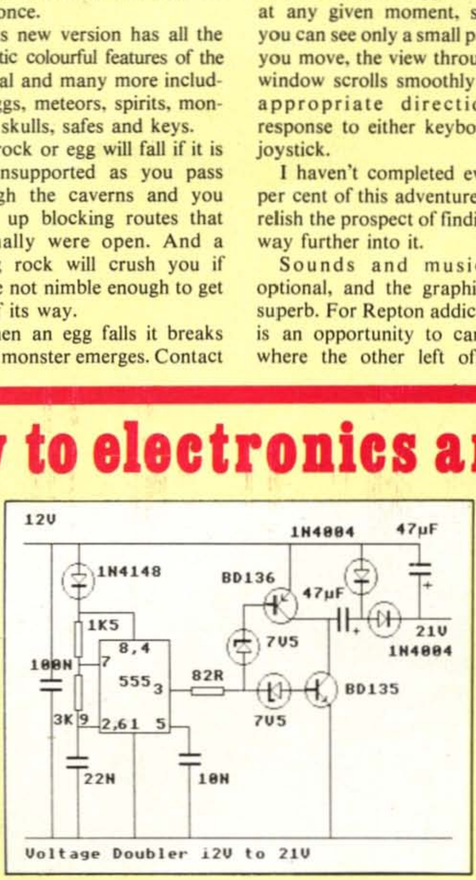
THE Secondary Science program **Microtechnology**, from BBCsoft is a package of learning modules in electronics and digital logic. Supplied on cassette with detailed instructions for transferring on to disc, it is accompanied by a clear and concise manual.

The first two sections deal with Boolean logic as applied to binary numbers and gates in digital circuits.

In each case there are increasing levels of difficulty, achieved by adding further types of gates.

The second module tests the application of Ohm's or Kichnoff's laws to an array of three resistors. As the calculations are sometimes difficult, a scratchpad is provided where you can make simple calculations in immediate mode.

Various types of flip-flop are simulated in the third program. You select the type of flip-flop and then apply the various inputs and the computer displays the effect of these inputs upon the outputs.



The final simulation is that of an electronic servo mechanism. In the same way as the flip-flops, you alter the various parameters while the program simulates the resultant effects on the circuit.

The final and best part of the package is a suite of programs called Circuit that allow you to design and display circuit diagrams.

The main part presents you with a grid on which you can draw a circuit diagram using the cursor keys.

Other keys enable the cursor keys to draw, move without drawing and erase. The diagrams can also be labelled.

In order to assist there are available 40 shapes – resistors, capacitors, ICs, transistors and so on – called by the function keys alone or with Shift, Ctrl or Shift+Ctrl.

The print routine – a sample output is shown – supports Epson FX80 printers, and I have found it to work happily with RX and LX80 machines.

The shapes can be altered by editing existing shapes, creating shapes from scratch and by using the tiny characters from which the shapes are made.

The last facility available from Microtechnology is the diagram display utility which allows you to present a slide-show of diagrams, with each diagram in the sequence – up to 30 – selected by function keys. This facility would be useful in a teaching environment.

In summary, Microtechnology is a versatile package which should prove useful for O and A level teaching. The circuit editing component is particularly good, although the version I had still contained some small bugs. It does not appear to support joysticks or mouse.

Ian Whitmore

Invaders make minds move

IF the thought of combining Space Invaders with a program to promote agile mental arithmetic seems at first a nice idea if not a little too far fetched then let's not be too hasty.

This is exactly what Mirrorsoft have done in the first of two programs by Widget Software in their **Quick Thinking Plus** package.

The first program, Sum Vaders, caters for one or two players, each having independent levels of difficulty, thus allowing adults to play competitively against children.

The game is based loosely around the Space Invaders theme, with a numbered spaceship travelling across the screen dropping numbered aliens.

The object is to perform the mathematical calculation requested and enter the correct answer before the alien lands.

The options for play are initially selected after loading, and may be altered at the beginning of each new game if necessary.

They allow the selection of addition, subtraction, multiplication or division, with five levels of difficulty for addition and subtraction, and three for multiplication and division.

If the alien is allowed to land, or an incorrect answer given, one of five possible landing sites at the bottom of the screen becomes filled.

This continues until all five sites are occupied, after which the game is over.

The second program is Robot Tables, which combines an assembly line machine with multiplication tables.

After loading, the initial options are selected and the screen clears to display a production line with a steam driven machine as its centrepiece.

A series of numbered blocks are aimed towards the machine on a conveyor belt. A multiplication problem is displayed at the start of the production line, and the player has until the block reaches the entrance of the machine to decide whether to accept or reject the number as the correct answer.

At this point there are four possible outcomes. If the block is correctly numbered and accepted it will be processed to produce a little robot at the end of the line. Alternatively if it is rejected it will be destroyed by the machine. If the block is incorrectly numbered and accepted a deformed robot is produced, or if rejected the block is recycled for re-use.

MIRRORSOFT
QUICK THINKING
by Widgit Software
FOR USE ON BBC B/ELECTRON

A few games of Sum Vaders gave me new insight into improving my mental arithmetic.

Tarquin Thomas

Macho match

THE simple but attractive title screen of **Match Day** gives a foretaste of the superb 3D graphics to come in this new football game from Ocean Software.

The players are both chunky and colourful, with the man nearest the ball being controlled either by joystick or re-definable keys. The other players are controlled by the computer, moving with the flow of play.

The game is fast and furious, with the camera view scrolling to keep up with the play. The normal rules of football apply, with the exceptions that there are only eight players per side – a fact which doesn't seem to be noticed when you are playing – and there is no half time or change of ends of players.

The clock above the centre line starts with 90 minutes showing, but this is not real time, each game lasting approximately 10 minutes.

Any infringement of the rules results in a blast on the whistle, then the appropriate throw in, goal kick or whatever is awarded. A goal is loudly applauded by the crowd.

BBC MICRO
MATCH DAY
ocean

Playing against the computer is fairly difficult, but this game really comes into its own when other members of the family are involved, and soon an inter family competition develops.

There are one or two minor criticisms which in no way detract from enjoyment of the game. The program cannot be transferred to disc – the loading time is nearly five minutes – and the instruction screens leave a little to be desired

Rom Manager users will need to turn their ROM off before loading the game or the screen display will be badly affected.

Alan Cockman

Timely challenge

MANY youngsters nowadays wear digital watches, but appear to have little real concept of what 10.35, for instance, really means. Indeed I have known children who will happily tell you it is "ten thirty-five", but are unable to tell the time on an analogue watch or clock indicating the same time.

Thus there is a vital need for programs which show a definite link between the two systems, such as **Time-Trucker** from ASK.

On my first few run-throughs, I wasn't particularly impressed, as the time aspect seemed less significant than the game.

This involves driving a truck around a series of farms collecting fresh produce which has to be delivered to the depot.

However, as I used the program I became more convinced of its educational value within the classroom. The range of options will make it relevant to a wide range of abilities and ages.

The child takes on the role of Trainee Trucker, Trucker or Super Trucker, each leading to a slightly different game.

The farms are situated around a road system which scrolls in all four directions as required. They may be open only at certain times, and so clock watching becomes an important exercise.

To aid the child, a large analogue clock face is shown at the bottom of the screen and the hands move according to the difficulty level of the current game.

There is, fortunately, an option to adjust the volume of the catchy little tune which sounds lovely for the first five minutes, but then wears a little thin. It is this sort of attention to practical details which make ASK programs well respected by teachers.

The graphics are very presentable, and the whole concept is one which provided a very challenging and enjoyable game in which the link between digital and analogue times is well demonstrated.

Indeed, when the children are in bed, parents could well find the game aspect quite challenging and enjoyable too.

Phil Tayler

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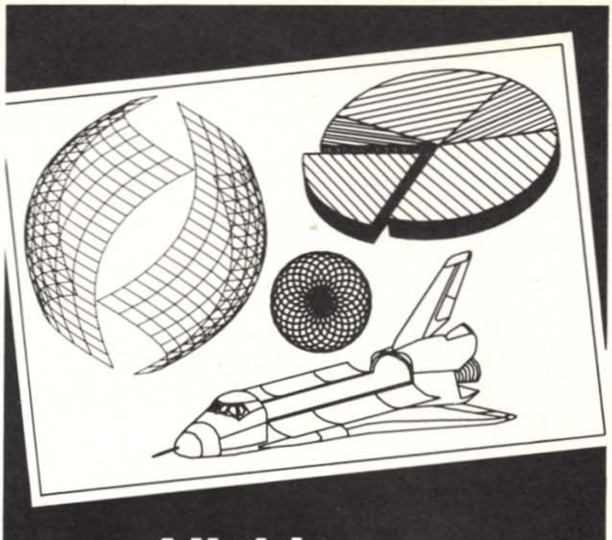

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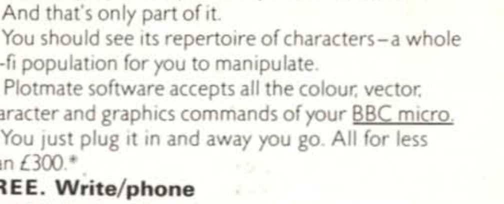

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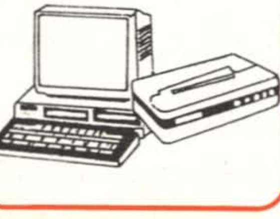

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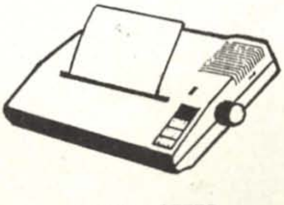

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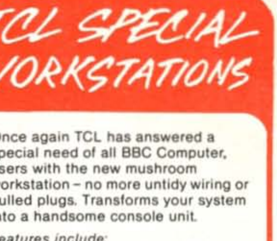

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RAM16	£32.00
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RA32+	£58.00
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The RAMAMP boards come complete with RAM inclusive in the price and are fully buffered. Fitting takes only a few minutes. No soldering required. No bits of the I/O port are used. All bits of the I/O port are yours. Free software is available. Write protect switch can be fitted if required.

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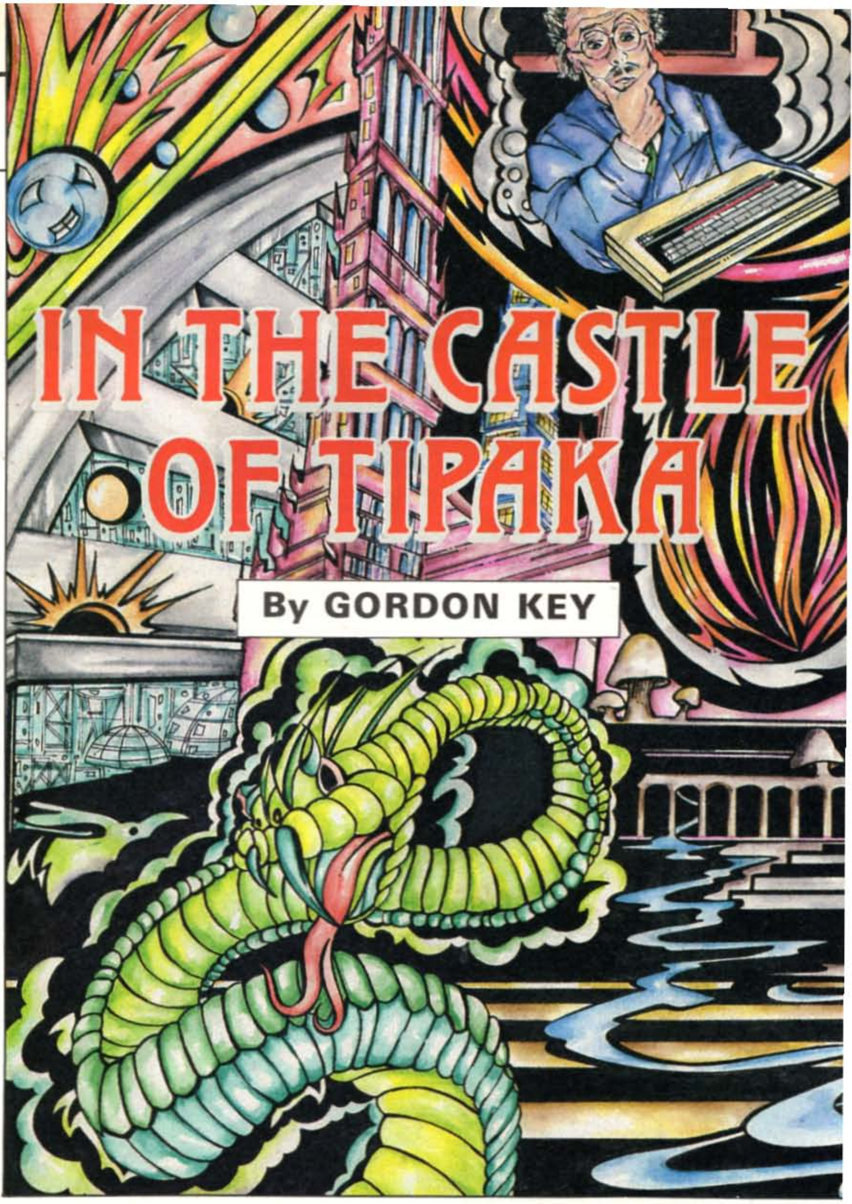
IN THE CASTLE OF TIPAKA

By GORDON KEY



YOUR troubles really started when you came across the tiny computer shop on the London road and bought that second hand modem from the strange little man with the odd accent and gleaming eyes.

A modem that didn't need a telephone, a strange idea in itself, but still after some haggling you paid him his £20 and wandered off home thinking how clever you were to knock the price down so much.

You'd never seen so much detail and colour on your BBC Micro, almost as though there was a Mode –1. The effect was quite hypnotic, swirling colour and sound that rippled and throbbed in your head, round and round, spinning and twisting deeper and deeper into your mind until you began to feel drowsy, drowsy . . .

Suddenly a blinding flash and the whole world seemed to fall into the modem, sucked and drawn into an ever lengthening ebony thread.

After what seemed an eternity of numbing velvety blackness you found yourself sitting here, next to this thing that looks like a door yet somehow isn't there, dressed in clothes you had never seen before and holding what appears to be a strange sort of weapon.

Slowly your head clears and you begin to take in your surroundings. The floor is so black and featureless that you feel you are hovering like thistledown over a bottomless chasm and that any moment you will plummet irretrievably into its infinite depths.

The walls glow with vivid mottled colour that seems to stare and watch you with the menacing intent of a hungry lion, and overall the strong acrid smell of ozone permeates the air.

Then suddenly the worst shock of all – you know why you are here. How you know you can't understand, but know you do, and that knowledge sends a shiver of fear like icy fingers running down the centre of your spine.

You are entombed in the castle of Tipaka, imprisoned there by the Logan King so that your repeated deaths might provide him with a morsel of pleasure and sustenance. Your only hope of escape is to make your way to the roof of the castle where you will be granted transport home.

To aid you in this task you have been given five lives – or five deaths depending on your point of view – and you can increase this number by eating the enchanted mushrooms you will come across on your travels throughout the castle.

There are some 20 rooms on each of the three floors that comprise the main body of the castle, and these rooms are patrolled by gangs of guardforms which are attracted to the jacket you are forced to wear.

The guardforms range in ferocity from the slow rotons that run in groups of six, through the quboids to the fast machons that work in pairs.

The gun you are carrying will usually expel a guardform from a room for a limited period, but should a guardform touch you or should you bump into a wall, you will die instantly, electrocuted by a million volts of static electricity.

There is also the Loghost and its attendant demon, an evil creature of the night that will pursue you from room to room and destroy you should you remain in any room too long.

In order to get to the next floor level you must find a special key and return it to the door through which you entered. Do this three times and you will be released.

KEYS

Z	Left
X	Right
*	Up
?	Down
Space	Fire

You now also realise that I, the Logan King, will watch you and feed from your pain each time that you die in infernal agony. May you eat many mushrooms!

Tipaka was written originally on a 6502 second processor and on trying to transfer it to the standard model B I found some difficulty in running 14k of program in Mode 2. I was therefore faced with the option of breaking the program up into two or more parts, wasting catalogue space on disc and time on tape, or coming up with an

SCORE:3
LIVES:3
ROOM:1
LEVEL:1

alternative.

This is where PROCshorten was born. The idea was essentially very simple, a large portion of most programs is taken up by redundant coding, character definitions, envelopes, assembler, long-winded instructions and so on.

All these items of code are only used once at the start of a program and then just serve to waste space, so why not throw them away?

And that is just what PROCshorten does. It calls all the redundant code then initiates a search through memory from PAGE upwards.

You will see from Table I that Basic stores program lines in the form of strings, each terminated by a carriage return character. The third byte of the line contains the line length, and by using this value to point to the next line or string PROCshorten searches for a particular string and POKEs the value of &FF into byte N+1 when the string is encountered.

This then becomes the new end of program marker and when the program is re-run everything after this point will be ignored by Basic.

In this instance the string THEEND is searched for. Also as the string is stored on a line number between two procedure definitions, no error can be generated as the line is never interpreted.

The tokens representing OLD and RUN are then put into the input buffer with the use of *FX138 and the program ENDs. It immediately re-runs, but with a shorter length and clear variable storage space.

The OLD is required to reset the value of TOP, as simply using RUN would not reset the program pointers and a *No room* or *Bad mode* error would occur. Any value that needs to be passed to the main body of the program can be passed via the resident integer variables as with a chained program.

When it comes to typing in Tipaka there are a few important points to bear in mind.

Firstly, and most importantly, make sure that you save everything before running the program. If you don't, at best you will lose everything after line 24115 when PROCshorten does its job, or if there is an error in the assembly language you could lose the whole of your efforts.

It is also important that you type in line 24115 exactly as in the listing, with no leading or trailing spaces. This is due to the fact that PROCshorten looks for "24115THEEND" and will not respond to "24115 THEEND".

If you are going to renumber the program do not type in any REM lines before line 10. This is because FNread uses RESTORE with a calculated line number and expects the DATA to start on line 10.

If you are using discs you should call the saved file *TIPAKA* so that PROCshorten can rechain the correct program if PAGE is set above &1100. If too many spaces are added to the listing disc users will have to download the program to &E00 before running it. Errors such as *No room* indicate that there is insufficient memory to execute the program.

PROCcode includes a double check-sum error check, but this could fail if two errors cancel each other out, so save everything before running.

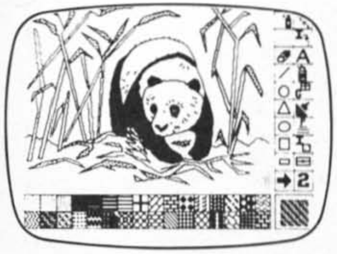
To make typing and error correction easier all procedure and function definitions start with a line number that is a multiple of 1000.

→

PAGE	&0D – carriage return.
PAGE+1	MSB of line number.
PAGE+2	LSB of line number.
PAGE+3	Line length.
PAGE+4	First line of Basic coding up to PAGE+N.
PAGE+N	&0D – carriage return.
PAGE+N+1	MSB of line number.
PAGE+N+2	LSB of line number.
PAGE+N+3	Line length.
PAGE+N+4	Next line of Basic coding.
PAGE+NN	&0D – carriage return.
PAGE+NN+1	&FF – end of program marker.

Table I: How program lines are stored

HIGH-RES GRAPHICS AT LOW-RES PRICE



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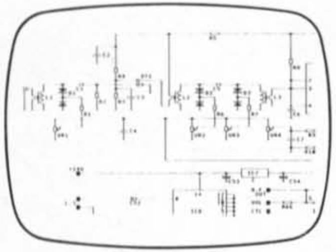

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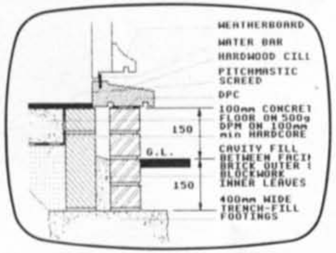
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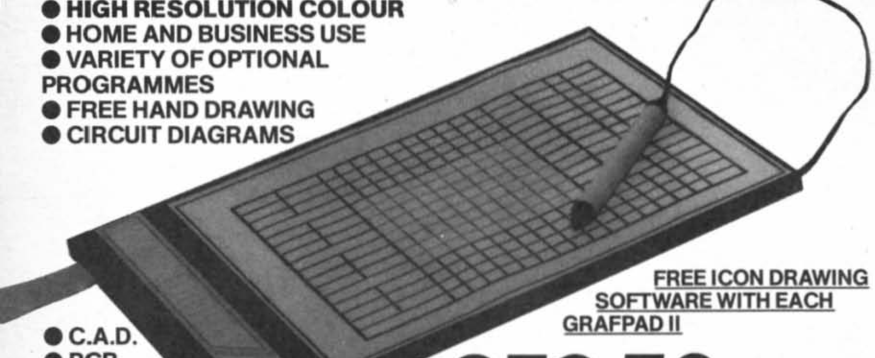

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From Page 95

PROCEDURES

quest	Tells you what you have to find, sets the room contents and defines the key.
cls	Clears the screen and resets the guardform colours.
lose	Informs you that you have failed in your escape attempt.
win	Informs you that you have escaped. (It's very unlikely that you will see this one!).
rego	Prints your score and calls the highscore routine if you performed well enough.
tde (X%,Y%,A$)	Prints A$ with a 3D effect starting at point X%, Y%.
spc	Waits until the space bar is pressed.
g	The main game loop. A short procedure name is used for speed.
p	Moves the Loghost.
f	Moves the bullet.
sc	Updates and prints the current score.
m	Gets keyboard input and decides the direction of your movement accordingly.
d	Calculates what direction the gun is to be fired in.
b	Decides what to do when you bump into an object.
tune(P%)	Plays one of four jingles.
wink(A%)	Flashes the man and the appropriate object when you are electrocuted then prints the dead body.
start	Returns you to the start after you have died.
col	Resets the colours to the correct logical values for the game.
wrm	Calculates which room you have entered.
room	Draws the room and its contents.
read	Reads and deciphers the DATA for PROCroom.
init	Sets all initial values for the game part of the program.
hiscore	Prints and updates the highscore table.
input	Gets your name for the highscore table.
code	Generates the machine code that is used to print the man in four colours, calculate the direction of movement and print the guardforms.
char.	Defines the characters and envelopes.
instruct	Prints the instructions if required.
tipaka	Prints the program title.
get	Waits for the space bar to be pressed.
scrol	Clears the screen by scrolling upwards.
shorten	Program shortening procedure.

Full listing starts on Page 146

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★ Your qualification group: full results and table.

TAPE 2 (Finals)
★ Choose a 20 man squad to take to the finals.
★ Group of 4 prelims. 16 to final knockout comp.
★ Extra Time, PENALTY SHOOT-OUTS, where relevant.
★ Formation and strength information on opposition.
★ 2 from 9 substitutes (the FA tells us so).

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AMATEURS & PROFESSIONALS

For newcomers to databases as well as seasoned users, DataGem represents an ideal starting point. Structuring your file and layout couldn't be simpler using DataGem's on-screen 'painting' format. You can have up to 62 fields or data items wherever you want them on a scrolling 120 x 120 card. Colours are all definable, and field data and field titles may be separated if required. Data entered may be stored in up to 8 tiers or 'levels', as well as within the whole database file. Scan one level or the whole database for records that match your search parameters, and place them in another data level for later manipulation. DataGem also boasts limited facilities for producing data merged letters, and may be configured as a 62 cell spreadsheet.

TECHNICALLY SPEAKING

The System Comprises:-

1. 2 EPROMs mounted on carrier board containing 24K of 6502 optimised machine language. Carrier board may be inserted in either of two positions under keyboard or in sideways ROM board.
2. Demonstration applications disk in both 80 and 40 track format with documented examples of DataGem files. Disk contains no DataGem program code.
3. Full colour packaging consisting of A5 ring binder with professional documentation, user registration card and quick reference card.
4. Utility program named 'Trans' also supplied to allow transference of data files from all other Gemini databases.

The System Features:-

- Permits just ONE file to exist over FOUR floppy disk drive surfaces with a maximum file size of at least 10 Megabytes.
- Allows up to 5100 User Definable Records.
- Maximum number of 62 fields per record, which may be any combination of the following types:-
  STRING – Up to 120 characters long
  DATE – Either two or four digit year dates may be selected.
  TEXT – A field with no data, allowing background text to be placed anywhere on the record. This may then be altered/moved/deleted, even after the database is in use. Up to 3000 characters of background text may be placed on the record in this way, enough for limited word processing and mail-merge.
  NUMERIC
- Allows searches on any field or COMBINATION of fields to ANY depth.
- Up to 9 subsets of data INSTANTLY available and saved to disk automatically.
- Sorts alphabetical or numeric on any field, ascending or descending with NO LIMIT on the depth of sort.
- Interfaces with 'VIEW' and 'WORDWISE'.
- Includes a free format report generator for a completely flexible printing format.
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  +, −, ★, /, multilevel parentheses (up to 50 levels), unary negation.
- Logical Operators
  >, <, >=, <=, <>, =, ★(AND), +(OR).

WHAT OTHERS SAY

DataGem provides many of the Spreadsheet facilities of an item like Lotus 1-2-3... Combined with a Word Processor, it forms the basis of a very competent small business system.
Personal Computer News – July 1984.

DataGem stands out in terms of both price and performance. Excellent if you can afford it.
Acorn User – December 1984.

NEW DATAGEM GUIDE

Available separately to existing owners of DataGem (see below), this new and comprehensive manual has just been completely re-written by Simon Williams, a veteran press reviewer and writer. The new guide takes you step by step through all the facilities of the program with worked examples, and without any requirement for a previous knowledge of databases. It contains over 40,000 words and is fully indexed.

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DATAGem

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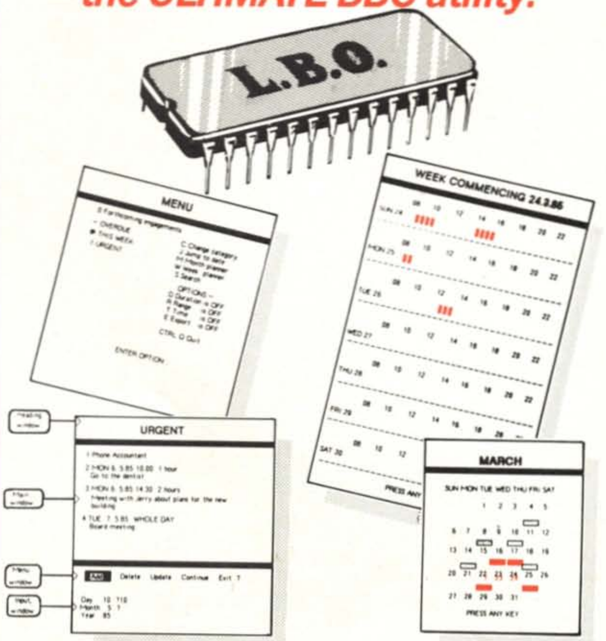


1 Phone Accountant

2 MON 6. 5.85 10.00 1 hour
Go to the dentist

3 MON 6. 5.85 14.30 2 hours
Meeting with Jerry about plans for the new building

4 TUE 7. 5.85 WHOLE DAY
Board meeting

Day 10 ?10
Month 5 ?
Year 85

A NEW & EXCITING ROM RELEASE FROM GEMINI

This is a comprehensive life and business organiser package in 100% machine code which has been very carefully designed to provide a wide range of useful facilities for the busy person at home or in the office, and is simplicity itself to use. Once you start using LBO, you'll ALWAYS use it – not like one of those ROMs you only occasionally call on. LBO will put an end to forgetfulness and ensure that your time is organised, you know what you have to do and when, you don't forget bills or birthdays, and you are reminded constantly of urgent matters.

LBO was written by two graduates in Computer Science from Exeter University in consultation with a lecturer in Cognitive Psychology. It has been very cleverly researched and programmed and is confidently recommended by Gemini as a very superior program for the very superior BBC micro.

Features include:-

- Automatic reminder of entries overdue for attention
- One week's advance notice of forthcoming events
- Urgent notice board
- Creation of categories of entries; e.g. bills, birthdays, letters to be written, notepad etc.
- Sorting of appointments by date and time of day
- Month AND week's summary at a glance, indicating time booked and free
- Single entry of a RANGE of events and updating of regular happenings
- Super search facility to call any event by any related word or part word
- Month by month preview of all forthcoming events
- Built-in intelligent calendar
- All data saved to disk
- Full printer support
- Easy to follow documentation

Use LBO to organise your life from today until 1999! It can handle literally hundreds of multi-line messages, as many as you are every likely to need. Despite the very wide range of facilities offered, this professional program is VERY easy to use and requires absolutely NO knowledge of computers. A vital aid to your everyday life, LBO is GREAT FUN TO USE!

Gemini
SERIOUS SOFTWARE
LIFE and BUSINESS ORGANISER

L.B.O.
only
£19.95

Also available on DISK for those with a cluttered ROM board – £19.95.
QL version also available now, MS-DOS version early 1986.

Gemini DISK SOFTWARE

DDD Suite

THE REVOLUTIONARY 'TRIPLE-D' BBC DISK INTEGRATED SOFTWARE SYSTEM

Of great significance to businessmen, educationalists and hobbyists alike, these programs are certainly the most powerful and sophisticated of their breed, and may be used 'stand-alone' or together as a suite. Gemini have probably the most experience in writing serious software for the BBC micro, with classics such as BEEBCALC and BEEBPLOT achieving sales of tens of thousands of units. We have drawn on almost four years of experience and user feedback to produce what we are confident will be hailed as the ultimate in functional software for the BBC micro: the ***'TRIPLE-D'*** Integrated Suite. We've also brought it in at a price that should make it accessible to more of you, and most importantly, we're giving you REAL value for money.

The modules, which are formatted for both 40 and 80 track systems, are available separately, or as an economical combination pack. Each module is clearly documented with a comprehensive, indexed manual, with training sections that refer to demonstration applications provided with each disk. Remember, ***'TRIPLE-D'*** uses proper random-access files that will take advantage of your true disk capacity, even over TWO drive surfaces. Have you ever heard of a true disk-based spreadsheet before? Well it's here now in the form of the ***'TRIPLE-D'*** suite and can handle up to 52,000 FILLED cells! If you already have our 'DataGem' ROM database, you'll be pleased to know we've even included some special utilities for you!

I confidently recommend the ***'TRIPLE-D'*** suite to you. If you purchase the product from us and don't share my enthusiasm, return it to us in new condition within seven days of purchase and we'll refund your money – immediately and without quibble.

Dale Hubbard
Chairman & Managing Director
Gemini Marketing Limited

DDD -BASE £29.95

- Up to 2000 records, 1 search level subset, 26 fields/record, 2 drives, 79 chars/field
- Scrolling screen, 79 x 26. Interrupt driven real-time clock
- Layout painted on-screen to your design, including background text/graphics
- Fully menu driven, with powerful line editor and access to *OS commands
- Default entry capability, no need for tedious re-typing of repetitive data
- Lightning search using advanced 'hashing' techniques
- Powerful maths, allowing all BASIC functions, on any field
- 10 user-defined variables to simplify complex calculations
- Multiple level 'intelligent' sort – program only sorts 'out-of-order' data
- Printed reports in record or summary format. Data spool option for transfer to other files
- FULL DATA COMPATIBILITY WITH 'DDD-CALC' AND 'DDD-PLOT'

DDD -CALC £29.95

- True disk-based spreadsheet, 2000 rows, 26 columns, 52000 cells. Powerful line editor
- Fast, smooth machine code screen scroll with pop-down menu
- Individually adjustable column widths with text overflow
- Full relative and absolute replication
- Find and move to a row by name
- User defined variables, delete/insert rows, SORT rows with 'DDD-Base'
- Send data from all or part of sheet to printer, or just print cell formulae
- Data over 1 or 2 drive surfaces
- Fast recalculation, even over large files
- All BASIC functions allowed, plus 'SUM', 'MAX', and 'MIN'. *OS calls, and real time clock
- Data spool option for merging with other files
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-PLOT'

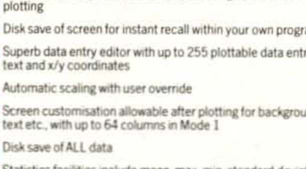
DDD -PLOT £29.95

- Stunning menu driven colour graphics using the BBC's capability to the full
- Pie charts, histograms, scatter graphs, line graphs and function plotting
- Disk save of screen for instant recall within your own programs
- Superb data entry editor with up to 255 plottable data entries for text and x/y coordinates
- Automatic scaling with user override
- Screen customisation allowable after plotting for background text etc., with up to 64 columns in Mode 1
- Disk save of ALL data
- Statistics facilities include mean, max, min, standard deviation, line of best fit, correlation coefficient etc.
- Colours re-definable for any plot
- Epson m/c fully SHADED screen dump with interface for other dumps on request
- FULL DATA COMPATIBILITY WITH 'DDD-BASE' AND 'DDD-CALC'

Combo Pack – All 3 modules £69.95

NEW!

MONEY MANAGEMENT



This program is designed for disk users. It allows individual transactions to be stored and retrieved in respect of up to 5 separate Bank/Building Society/Investment accounts AND up to 5 Credit card/loan/Mortage accounts.

The transactions are also analysed – and may be (screen) listed – under 3 separate Income and 15 separate Expenditure headings.

Each transaction consists of:

(1) Date
(2) Description – up to 16 characters
(3) Amount
(4) Last 4 digits of cheque no. or a credit card transaction reference. (Payments only)

Account and income/expenditure headings may be personalised.

Budget amounts can be stored for each of the 15 expenditure heads and a report shows how expenditure to date compares with the budget. It also shows the balance remaining. This report is also produced in percentage terms and a third report forecasts annual expenditure based on expenditure to date at any particular time.

A further report gives balances for each Bank/Loan account at the beginning of the year, balances for each income/expenditure account to date and the resultant Bank/loan account balances. This report represents, therefore, the changes in liquid assets and liabilities over the period, both in terms of totals and of distribution between accounts.

The main menu contains a print option for this report.

Lists of outstanding cheques or credit transactions may be produced for each account and when statements are received, input of the cheque reference no. (last 4 digits) and the amount causes verification to occur (on screen), whereafter these cheques are removed from the cheque no. file, the remaining list of unpresented cheques allowing simple reconciliation of each Bank a/c. Similar reconciliation of credit card a/cs can be achieved.

The program caters for transfers between accounts (e.g. from Bank to Building Society a/c or from Bank to Credit card a/c etc) the relevant details being input only once.

The program also allows for standing orders to be set up on any single account or between any two accounts. These are paid simply by inputting a date up to which the payment of all orders should be recorded. The necessary debits and credits are then created and the date of each order is reset. Orders can be for any multiple of calendar months.

The program is fully menu driven and all areas of input are 'range protected'. As much guidance as possible is included in all screen displays and the user is always given the opportunity to abort a transaction.

Full amendment and deletion routines are provided; for individual transactions, for Standing orders and for budgets.

The main file can hold between 800 (all full length descriptions) and 1800 (no descriptions) transactions. The former should be sufficient for most people for at least one year and the index file size is set on this basis. A warning is flashed on the main menu when the main file reaches 750 transactions. Account balances may be carried forward to a new set of accounts.

All you will ever need in a home finance package and beautifully presented.

ONLY £12.95 Highly Recommended

Gemini VALUE!

With over four years experience of providing practical software solutions for business and home applications, Gemini have put together a selected range of famous titles for the BBC and BBC Plus in TWO special packs, at VERY SPECIAL prices. These super value packs contain all the serious application software you're ever likely to need for your BBC, from spreadsheet and database management to a complete professional business accounting system. Gemini's 'OFFICE MATE' and 'OFFICE MASTER' packs are here – put that computer to WORK!

Office Mate

• DATABASE • BEEBCALC SPREADSHEET • BEEBPLOT GRAPHICS • WORD PROCESSOR • FULL DOCUMENTATION

DATABASE

Use this program for storing all types of information just the way YOU want to store it. You set up a computerised 'card index' system and add records and data to the file in the format that you choose.

Advanced features include sorting and searching for specific records, mathematical calculations, printer routines, data summaries etc. If you don't have a database, you certainly should!

BEEBCALC SPREADSHEET

Perhaps the most commercially successful item of business software yet written, the Gemini Spread Sheet processor offers a very wide range of invaluable calculation and editing features.

Consider, for example, a Cash Flow forecast containing rows and columns of figures, combined with text and numbers. If say, the cash receipts for January need to be changed, it would normally be necessary to delete and recalculate several figures for each successive month.

With BEEBCALC, however, an 'on screen' amendment to the January figure is made, and the corrected figures for each successive month automatically appear upon touching the 're-calculate' key.

Formulae cells in the table may be specified which relate to each other and then copied RELATIVELY or ABSOLUTELY to other parts of the program, which in itself is modular, and directly linkable to other Gemini programs. BEEBCALC has a complete range of inbuilt data entry and formatting techniques, and the structure of the table may be amended at any stage. Of course, full printer facilities are included which allow for either the table to be printed or just the data and formulae relating to the table. Another important feature, any valid BBC BASIC formula is acceptable as data entry making the system immensely powerful and versatile. BEEBCALC's sister program, BEEBPLOT will take data from disk or tape files created by BEEBCALC to provide data portrayal in graph, histogram or pie chart format.

BEEBPLOT Graphics

Written specially for use with the BBC micro, this program makes full use of the high resolution colour graphics to provide an easily assimilated visual representation of numerical data.

For example monthly sales statistics comparing two year's results may be instantly converted into two side by side pie charts, histograms or graphs ... for easier visual comparison and assimilation.

BEEBPLOT also incorporates a built-in machine code screen dump, enabling a high resolution printed image to be produced using an Epson or similar bit image compatible printer. It also interfaces with other Gemini programs such as Beebcalc and Cash Book and is particularly recommended where any kind of mathematical plotting facility is required.

WORD PROCESSOR

This program provides many routines found in large and more expensive packages. With a typical word length of 5-6 letters it allows for up to 1000 words in memory at one time and is ideal for the user who wishes to write any kind of business letter on a home computer.

Features include: block delete, block insert, search and replace, edit text, display text, and many more.

Step up to Office Mate and save money!
(Price if purchased individually - £79.80
– save £67.80 with this pack)
Electron version available,
pack contains Database, Beebplot,
Beebcalc, Home Accounts,
Cassette only.

OFFICE MATE
£12
Cassette or Disk

Office Master

• CASH BOOK • FINAL ACCOUNTS • MAILIST • EASILEDGER • INVOICES & STATEMENTS • STOCK CONTROL • FULL DOCUMENTATION

CASH BOOK

Gemini's CASHBOOK is a complete 'stand-alone' accounting software package for the cash based sole trader/partnership business. It is designed to replace your existing cash book system and will provide you with a computerised system complete to trial balance.

Simple to use, this program will replace your manual cash and bank records and provide vital management information at any time. It will take you from sheaves of invoices and cheque book stubs to trial balance, and may, if desired, be used in conjunction with the Final Account program.

Typical information from CASHBOOK is as follows: **1.** Summary of VAT information to enable completion of VAT returns. **2.** Cumulative receipts and payments report analysed over the standard profit and loss and balance sheet headings. **3.** Option for departmental analysis of sales and purchases. **4.** Printout of all transactions, nominal account balances etc. **5.** Journal routine for entering transfers between accounts and year end adjustment for debtors, creditors, etc. **6.** Trial balance. **7.** Full audit trail facility.

This program is recommended not only for businessmen, but also for practising Accountants for use in the preparation of Accounts from incomplete records; a printer is essential.

FINAL ACCOUNTS

Requires Gemini 'CASHBOOK' module (except Commodore 64 version)

This program will take data prepared by your Gemini Cashbook module and produce a complete set of accounts for you in the following format: **1.** Trial Balance with inbuilt rounding routine. **2.** Notes to the Accounts. **3.** VAT summary. **4.** Profit and Loss Account with comparatives facility. **5.** Balance Sheet with comparatives.

All reports may be produced at any time interval comparing actual to budget if required.

MAIL LIST

Gemini's Mailist program will enable you to keep a record of names and addresses and then print, examine, sort and find themn, all with special selection techniques. All our mailists contain our exclusive 'SEARCHKEY' system, giving you the option of creating your own dedicated coding system for each name on file. For example, on most mailing list systems, you are only given the standard heading such as name, street, town, country, postcode etc. With the Gemini searchkey system, you could find, say, all names on the file that are companies having a turnover in excess of '50,000' or all names that are subscribers who are behind in their subscriptions or all names that are eligible for a Christmas card this year!

A full and useful range of routines is included in the menu, and the program allows you to set up your own format for printing labels, i.e. the tab settings you require and spaces between labels, etc. Multiple copies can also be printed.

EASILEDGER

Contains routines to enable the small business man to keep a record of one of the most important aspects of his business – cash flow.

EASILEDGER is essentially a debit/credit ledger system which can handle sales, purchase and nominal ledger routines to provide instant management information. Its flexibility lies in its ability to produce account balances instantly for debtors and creditors, together with a record of all transactions, dates and references. A year-to-date summary of sales, purchases, receipts and payments over the twelve month period is also provided, as is a complete INTERACTIVE bank account database.

EASILEDGER is a management aid software tool and is designed to run alongside an existing accounting system. If you operate a cash based business and require a complete accounting package to produce the accounts to trial balance and beyond then we recommend you consider using both Easiledger and Cashbook programs together.

INVOICES & STATEMENTS

The Gemini INVSTAT program greatly reduces the time and cost of preparing Invoices and Statements by storing essential information such as customer names, addresses and account numbers, VAT routines and footer messages such as 'Please remit by return', 'Overdue and outstanding', etc.

Not only are Invoices and Statements produced more quickly and accurately, but pre-printed forms for them are eliminated since the INVSTAT program produces professionally formatted documents using your own printer.

STOCK CONTROL

You have a stock of products. With the Gemini program you may enter details of each product on to a record card on the computer with details of your own existing part number (if any), a description of the product, the unit quantity (i.e. one, a gross, a pair, etc.), the cost price per unit, the selling price per unit, a specified minimum satisfactory stock level, units in stock ordering quantity and supplier details.

The program will allow you to enter stock received, stock out, and will also give you a summary of stock items and current holding, together with details of total cost of stock, total sales value of stock, current gross margin on stock, cost of bringing stock up to minimum level, understocked items, etc.

Each stock item has its own computerised record and you may browse through the file as a whole, or just a specified number of records. An extremely powerful program, highly recommended for inventory control in small and medium sized businesses.

OFFICE MASTER
£25
Cassette or Disk

Gemini *INTEGRATED ACCOUNTS & HARDWARE*

WHY INTEGRATED ACCOUNTING?

Because it will retrieve information stored in one program for use by another, and store data in one program which has been generated by another.

This means that the scope for human transposition error is virtually eliminated ... for example, when typing an invoice manually, the typist could type £14.25 instead of £41.25, and undercharge the customer. Such an error cannot occur with integrated, computerised invoice generation, since only the part number needs to be entered and the price (and product description), are taken AUTOMATICALLY from the Stock Control program, and printed AUTOMATICALLY onto the Invoice.

Likewise a Stock Controller, operating a manual system, could transpose the quantity sold, when posting from a copy invoice, and deduct 93 pcs from the Stock card, instead of 39. This would understate the book stock by 54 pcs, and possibly cause the product to be re-ordered, and consequently overstocked. Again, this could not happen with an integrated system, since the quantity invoiced is AUTOMATICALLY deducted from stock, due to integration of the Invoicing and Stock Control programs.

WHY THE BBC MICRO?

Because, although originally designed as an educational computer, it has the facilities needed for serious business use. In particular, speed of operation ... although only an 8 bit machine, it has a faster operating speed than many 16 bit micros. By gearing a suite of Integrated Accounting programs to the BBC Micro, Gemini have produced a combination of excellence which will eclipse any other computerised business system in its price bracket ... and many other systems in much higher price ranges.

WHY GEMINI?

Because our business software for the BBC Micro is based upon the solid foundation of experience.

We have successfully written business software for the BBC Micro since it was first launched.

Your choice of software for a computerised business system is critical ... badly written programs could bring your business nearer to ruin, more quickly than almost any other investment. The fine reputation of Gemini, evidenced by the Independent press comments listed below, are your guarantee of confidence in the professional experience which back this major investment in the efficiency of your business.

INTRODUCTION

Designed for the small to medium sized business user, where speed and efficiency are vital, Gemini Integrated programs are suitable for sole traders, partnerships, or limited companies. All require a BBC B 32K microcomputer, and an 80 column printer. A double disk drive with an Acorn compatible DFS is required for integrated accounting purposes. A single disk drive may be sufficient where modules are used independently, although this is not recommended for the Sales Ledger and Invoicing module. The manuals indicate the system capacities for various disk drive combinations.

The programs have been devised by H.C.C.S Ltd in the light of substantial mainframe computing experience, and share many of the features normally found only in very large installations. Used in a typical business environment where invoicing, sales ledger posting, stock control adjustment and nominal ledger posting is simultaneously made, the software will convert the BBC micro into a business computer of enormous power, directly comparable with hardware/software combinations costing many times its price.

Each program is supported by a comprehensive, easily followed manual, and 'user friendly' screen prompts with errer trapping routines, which make a specialised knowledge of accountancy unnecessary for the average user. All the programs, however, have many sophisticated features which make the programs revolutionary for the home micro market.

Gemini Marketing Limited confidently recommend the programs to serious commercial owners of the BBC B micro as software capable of making an enormous contribution to business efficiency and profitability at minimal cost, since it requires no expensive second processor in order to achieve the advantages of integrated accounting.

NEW LOW PRICE

Price £69.95 per Module

Gemini
Nominal Ledger

Includes 1 year software support

INDEPENDENT PRESS COMMENTS

John Vogler reporting in December 1984 edition of 'A & B Computing' said of Gemini Integrated Accounting when comparing to Peartree, Micro Aid, Software for All, Acornsoft Mirle and Sage:–

"This is the newest and most exciting. To have achieved a substantial degree of integration, very rapid file access and respectably large file sizes, without the use of a second processor, is a fine achievement. As one would expect from GEMINI, the individual modules are eminently professional and for the first time present the single processor BBC as a viable small business computer ... GEMINI have produced a superb product ... superb examples of the programmer's art."

INVOICING & SALES LEDGER

The Gemini Sales Ledger and Invoicing program will produce invoices and statements for customers and enable a tight control over credit procedures to be maintained by producing aged debtors reports, and by keeping current information concerning customer accounts.

The module can be used independently or interfaced with the Gemini Nominal Ledger and Stock Control modules, and offers the following advantages: • Maintains open-item sales ledger. • Comprehensive customer Master File maintained in memory. • Choice of fixed and free format invoices. • Integrates with Gemini Nominal Ledger and Stock Control modules. • Prints invoices, invoice copies, statements and credit notes. • Reports include: Aged Debtors, Sales Daybook Sales analysis by user defined code, VAT analysis, Audit trail giving copy details of all transactions. • Automatic updating of sales ledger. • Comprehensive accounting controls including period end close down routines and full audit trail for all transactions. • Examine customer status by file enquiry to screen or printer showing year to date activity. • Trade and settlement discount terms definable for each customer. • Caters for up to 5 rates of VAT. • Can hold up to 135 customers on 40 track disk system and up to 610 customers on a 80 track disc per Sales Ledger file. • Comprehensive analysis of invoices over unlimited, user definable sales codes. **Price £69.95.**

PURCHASE LEDGER

Used independently or interfaced with the Gemini Nominal Ledger, the program maintains a complete file for each supplier, records amounts outstanding at any time, helps to determine which invoices are payable, and payment dates for the claiming of discounts. Among this module's many features are the following: • Automatic posting of suppliers' invoices to Purchase Ledger. • Comprehensive analysis of invoices over unlimited, user definable expense headings. • Comprehensive accounting controls including period end close down routines with posting reports, and full audit trail facilities at appropriate stages of processing. • Full integration with Gemini Nominal Ledger module. • Purchase invoices and credit notes easily processed. • Supplier file held in memory, with full details of each supplier. • Maintains open item purchase Ledger. • Management of invoices due for payment within cash restraints. • Maximum number of suppliers on 40 track disk system of 135 and maximum of 610 suppliers on 80 track disk system per Purchase Ledger file. **Price £69.96**

NOMINAL LEDGER

This is the central module of the Integrated Accounting system and may also be used independently as a Cash Book or interfaced with the Sales and Purchase Ledgers and payroll programs. It includes the following main features: • 143 Nominal accounts all of which are user-definable. • Posting of transactions from Sales and Purchase Ledgers and Payroll modules. • Full Cash Book facilities. • Print out of full Trading and Profit and Loss Account and Balance Sheet together with notes to the accounts. • Full accounts may be produced for whatever period chosen by the user. • Comprehensive accounting controls including period end close down routines and complete audit trail for all transactions. • Journal feature for adjustments between accounts and correction of book-keeping errors. • Reports include: Account Master File showing complete code listing. Cash Book entry details. Journal printouts. Trial Balance. Trading and Profit and Loss Account with notes. Balance Sheet with notes. Audit Trail Enquiry for all accounts. • Account enquiry showing movements over the period under review including opening balance, period end adjustments and closing balance. • Account posting masks allow conversion of analysis codes set up in other modules into selected user-defined Nominal Ledger codes. **Price £69.95**

PAYROLL

This program provides a full range of controls over the different aspects of Payroll Accounting icluding tax and other deductions. It can be used independently, or interfaced with the Gemini Nominal Ledger, and offers the following facilities: • Employee file maintained in memory, containig: Name, address, sex, marital status, National Insurance Number and contribution type, date of birth, personnel number, department, date employment commenced, all applicable tax codes, whether week 1 or month 1 applicable, hourly or salaried, pay cycle, payment type (cash, cheque or direct transfer), PAYE reference number, previous name, bank details. • Supports weekly, fortnightly, four weekly or monthly employees. • Company master file containing: Name, address, bank account number and name, bank name and branch, PAYE reference. • Produces cash analysis of note and coinage to suit requirements. • Employee pay details include: Gross pay and tax paid to date both current and previous employer. National Insurance contribution for employer and employee. Five rates of overtime per employee. Up to 12 standard and 5 non-standard pay elements per employee. Basic pay. Hourly rate. • Reports include: Payroll reconciliation, Payslips, Coinage analysis, Cheque and bank giro list, Payroll masterfile, Departmental analysis. • Relevant data to complete Inland Revenue forms including: P11, P35, P45, P14/P60. • Maximum 98 employees on 40 track disk system and 198 employees on 80 track system per Payroll file. **Price £69.95**

STOCK CONTROL

A program providing full control over every aspect of stockholding operations which can be interfaced with the Gemini Sales Ledger and Invoicing program, this module includes the following features and routines: • Inventory Master File holding details of part number, selling and cost price, sales and product code, current stock, location of stock, allocated items, re-order level, quantity on order, current period activity and supplier code. • Permits four types of transactions – sales, returns, receipts and adjustments. • Part enquiry routines for any stock item. • Reports include: Part catalogue, giving stock sales and cost values. Re-order report. Evaluation stocks list, giving stock sales and cost values. Dormant parts report. Delete parts report. Stock usage report. Stocktaking sheet. Stock audit report sorted into part sequence and transaction type and date. • Screen prompt when item falls below the minimum re-order level. • Directly interfaces with Sales Ledger to enable automatic generation of product details for invoice production and adjustment of stock records. • Maximum 980 part numbers on 40 track disk and 1980 on 80 track disk per stock file. **Price £69.96**

Gemini's Office Mate and Office Master, sole distributors to the trade

CentreSoft Ltd

Unit 10, The Parkway Industrial Centre, Heneage Street, Birmingham,
B7 4LY. Tel: 021 359 3020. (Mail order to Gemini).

Special Hardware/Software OFFERS

Having arranged bulk hardware purchasing discounts, Gemini is now able to offer complete systems of hardware and software offering unequalled value for money. We offer a choice of hardware only or hardware with software as follows:–

DEAL 1

BBC SYSTEM comprising:–

- BBC 32K with DFS
- 40/80 switchable 800K double disk drive
- 80 column printer
- 12" screen monitor (for colour add £150 to system price)
- All connecting cables

OUR PRICE INC. VAT £999.95

MS-DOS version soon.

Please enquire by telephone for prices of individual hardware items.

DEAL 2

DEAL 1 with the addition of the following:–

- 'DDD' Integrated database, spreadsheet and graphics
- DataGem database ROM
- Integrated Accounts – ALL 5 MODULES
- Mail Merge utility for Integrated Accounts
- 'Video Classroom' programming educational video (VHS only)
- 'Life & Business Organiser' ROM
- 'Office Master' software pack
- 1 pack each pre-printed stationery; payslips, statements, remittance advice, invoices for use with integrated suite, plus one box 2000 sheets listing paper.

USUAL PRICE £1650 – OUR PRICE INC. VAT £1395

If not ordering by telephone, please use this order form to order any item on this page, or three preceeding pages. Please state your requirements clearly, and whether you require 40 or 80 track format when ordering disks.

Please allow 7 days for delivery.

24 hour CREDIT CARD HOTLINE – AMEX/ACCESS only – 0395-265165

All stated prices include VAT and post/packing.

To: Gemini Marketing Ltd., Gemini House, EXMOUTH EX8 4RS

Please supply ____________________

Name ____________________

Address ____________________

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Cheque/POs value £________ enclosed, or please debit my Access/Amex no.____________________

Signature ____________________

Export/Trade enquiries and Local Authority POs welcome.

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COMPUTER WAREHOUSE

1000's OF BARGAINS FOR CALLERS

THE "ALLADINS' CAVE OF COMPUTER AND ELECTRONIC EQUIPMENT

··· HOT LINE DATA BASE ···

DISTEL©

The **ORIGINAL FREE OF CHARGE** dial up data base. Buy, browse or place **YOUR OWN AD** for goods or services to sell. 1000's of stock items, spares and one off bargains. Updated daily.
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PRINTER / TERMINAL SCOOP

A MASSIVE purchase of these attractive stand alone terminal units enables a SUPER BARGAIN offer. Made by the US GENERAL ELECTRIC CORPORATION the GE MODEL 30 features a standard QWERTY 80 key electronic keyboard coupled to a quality built matrix printer with variable 3" to 9.5" forms tractor. The printer is capable of continuous duty printing with up to 120 characters per line. Standard RS232 interface accepts ASCII data at 110, 150 or 300 baud. Ideal for Terminals, Data loggers, local label printing, or just as a printer!! Sold TESTED with data **ONLY £95.00.**
Also available with TWIN MAGTAPE CASSETTE unit for data capture, data preparation etc. **£150.00**
Carriage £10.00

DON'T MISS THE CPM Deal OF the CENTURY

The FABULOUS CPM TATUNG PC2000 Professional Business System

A cancelled export order and months of negotiation enables us to offer this professional **PC, CPM** system, recently on sale at **OVER £1400**, at a **SCOOP** price just over the cost of the two internal disk drives!! Or less than the price of a dumb terminal!!

Not a toy, the **BIG BROTHER** of the **EINSTIEN** computer, the **DUAL PROCESSOR PC2000** comprises a modern stylish three piece system with ALL the necessities for the **SMALL BUSINESS, INDUSTRIAL, EDUCATIONAL** or **HOBBYIST USER**. Used with the THOUSANDS of proven, tested and available CPM software packages such as **WORDSTAR, FAST, DBASE2** etc, the **PC2000** specification, at our prices, **CANNOT BE BEATEN**!!

The central processor plinth contains the **64K, Z80A** processor, **DUAL TEAC 55F** Double sided **40/80** track disk drives (1 Mb per drive), **PSU**, 2K of memory mapped screen RAM, disk controller, **RS232, CENTRONICS** and system expansion ports, and if that's not enough a ready to plug into **STANDARD 8" DRIVE** port for up to **FOUR 8"** disk drives, either in double density or **IBM** format. The ultra slim **92** key, detachable keyboard features 32 user definable keys, numeric keypad and text editing keys, even its own integral microprocessor which allows the main **Z80A** to devote **ALL** its time to **USER** programs, eliminating "lost character" problems found on other machines. The attractive, detachable 12" monitor combines a green, anti-glare etched screen, with full swivel and tilt movement for maximum user comfort. Supplied **BRAND NEW** with **CPM 2.2**, user manuals and full 90 day guarantee. Full data sheet and info on request.

PC2000 System
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By STEVEN BROOKES

IN the early 20th century the creatures from a small planet called Earth launched a space probe which was intercepted by an evil alien force a few centuries later.

The creatures deciphered the code printed on the sides of the small ship and came across a word insulting beyond belief in their own language.

They immediately launched a task force which travelled across the universe to avenge the unintended insult.

Guess who they met. Right on. And unhappily for you, your ship bears that same derogatory lettering.

You have a single forward-firing pulsar beam with which to defend yourself. Of course, it would be easier to obliterate that rude USA from the sides of your ship . . .

When you have typed in and saved the program set PAGE to &1300 and re-load it by entering:

```
PAGE=&1300
LOAD"filename"
```

The program can now be RUN. You control your spaceship with these keys:

Z – Left
X – Right
Return – Fire

The battle is fast and furious so you'll need super reflexes to survive.

```
   10 MODE2:VDU23;8202;0;0;0;
   20 ENVELOPE1,1,-10,10,10,1,1,10,12
6,-4,-4,-4,126,96:ENVELOPE2,1,0,0,0,0
,0,0,126,-4,-4,-4,126,96:ENVELOPE3,1,
1,-1,1,10,20,10,126,-2,-2,-2,126,96:E
NVELOPE4,1,0,0,0,0,0,0,126,-1,-1,-1,1
26,96
   30 O=&FFEE:?&93=0:?&94=0
   40 FORX=&C00TO&C94:READ A:?X=A:NEX
T
   50 RESTORE90:FORX=&C95TO&CD9:READ
A:?X=A:NEXT
```

Turn to Page 143

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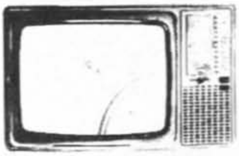

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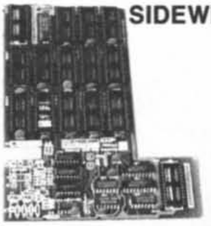

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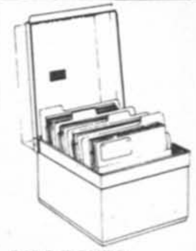

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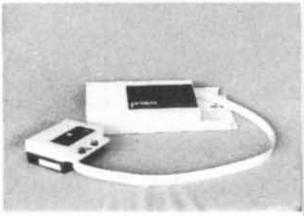

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TORCH
BBC

Source files without limits

By PETER JOHNSON

ONE of the disadvantages of using the assembler built into BBC Basic is the limited size of source and object files it can cope with.

"Grown-up" assemblers, such as Acornsoft's MASM, have the facility of splitting the source across several files. They also enable the source files to be created on any convenient editor, as opposed to restricting the user to the relatively primitive line editing capabilities of BBC Basic.

The program described here overcomes the source size limitation in Basic, and also lets you create BBC Basic assembler programs on a normal text editor such as View or Wordwise – providing no strange control codes, except tab and carriage return, are used.

Because the relocated assembly option of the assembler is used, assembling at *0%* for location *P%* using OPT 4, Basic II or above is required. Also, the "insert character into buffer" OSBYTE is used (number 138), so MOS 1.0 or above is required. The program uses only legal calls, so works fine across the Tube.

First I'll describe how source files for the program are created, then how to assemble them. Finally, I'll go through the details of the program itself.

A source program is one or more files. They may be pure text or Basic programs. If you use a text file, you can't use Basic expressions which include words which would be tokenised. For example, consider the following simple file which could be produced using View, Wordwise or even the DFS *BUILD command.

```
        LDX #&20
.LOOP   TXA
        JSR &FFEE
        INX
        CPX #&7F
        BNE LOOP
        RTS
~~
```

This doesn't contain any keywords, such as ASC, so it can be prepared as straight text. If you want to use the full set of Basic tokens in your programs you must prepare the source using the Basic line editor and save the program. In this case the example above would look like this:

```
1000 LDX #ASC" "
1010 .LOOP TXA
1020 JSR &FFEE
1030 INX
1040 CPX #ASC"~"+1
1050 BNE LOOP
1060 RTS
1070 ~~
```

Note that you don't need any of the ususal [.] or OPT, or the FOR loop around the source. You will have noticed the ~ character on the start of the last line. This introduces a special line.

There are three special lines. One beginning with ~~ means end of source, and marks the end of the last source file. It should always be present so that the program can start the next pass or finish cleanly.

Lines of the form ~*"file"* mean "chain this file" and are normally the last line of the file. For example, if your source was split into two files, *source1* and *source2*, the last line of *source1* (assuming it was a text file) would be:

The last line of source2 would be:

~~

to mark the end of the assembly. As many files can be chained as required.

The final type of special line is ~ followed by anything except ~ or " and denotes a line which should be taken as

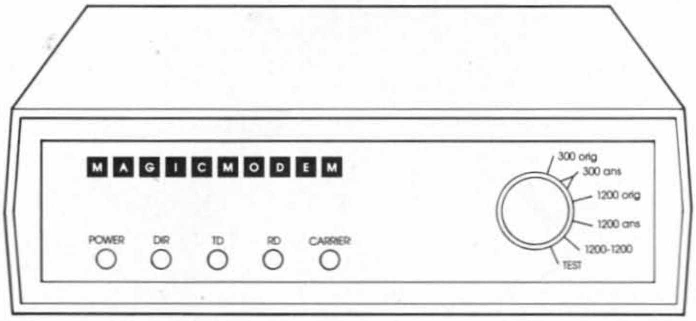
MAJOR VARIABLES

execAddr	Execution address for a non-memory object file.
file$	Name of current source file for error messages.
ms	TRUE if source is MEM, FALSE if it's a file.
mo	TRUE if object is MEM, FALSE if it's a file.
osfile	Standard filing system/MOS addresses.
osbget	Standard filing system/MOS addresses.
osbput	Standard filing system/MOS addresses.
osbyte	Standard filing system/MOS addresses.
objFile$	Name of the object file or *"MEM"*.
objAddr	Load address of object file or address of *MEM*.
scrLine	Address in memory where source line is to be poked.
srcFile$	Name of the (initial) source file, or *"MEM"*.

ZERO PAGE LOCATIONS

basic	Non-zero if source is Basic or 0 if it's text.
basicLine	Non-zero for a ~*Basic* line, else contains 0.
count	Number of bytes to be written by *writeLine* routine.
chain	Non-zero for a ~*"file"* line, else contains 0.
eof	Non-zero for a ~~ line, else contains 0.
objChan	Channel number of the object file, or pointer to *MEM*.
srcChan	Channel number of source file, or pointer to *MEM*.
status	Bit 7 set for memory source, bit 6 set for memory object.
zpPtr	Address of next zero page location to be allocated.

MAGIC



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MODEM

PROGRAM DESCRIPTION

1060-1100	Get the source filename, checking that it exists if it's a proper file. The variable *ms* is set to the channel number of the file if it exists, otherwise it will be set to zero.
1110	Sets *ms* to FALSE if it contains a channel number.
1120-1130	Set *basic* flag for the machine code *readLine* routine.
1140-1150	Get the object filename and set the MEM object flag.
1160	Stores the filename in the string buffer for the subsequent OSFILE operation which writes the load/execution addresses of the file.
1170	Gets object file address.
1180	Either pokes the memory object file address in *objChan* for a memory file or pokes the channel number for a DFS file.
1190	Sets the *status* zero page location according to the *ms* and *mo* flags.
1200	Sets the error handler to print the current source filename and to close all open files in case of an error.
1210-1340	Main assembly FOR loop. Use: `pass=4 TO 7 STEP 3` if you require a listing, but it will have an awful lot of *[opts* in it.
1350	Closes source and object files.
1360	If the object file is in memory, the program ends. CALL *objAddr* to execute it.
1370-1420	Set up an OSFILE parameter block with the load and execution addresses of the file and use OSFILE 1 to write these to the file's catalogue information. Program then ends.
1450	Sets up zero page locations and other variables.
1640-1690	Find *srcLine* – the address of the program line into which the source lines are poked by *readLine*. This line begins with *[opt pass:*
1700-1720	Assemble the machine code and clear the *~"file"* flag.
1790-1880	*getByte*. Return a byte of source code in *A*, using the source file or memory, as appropriate. Called by *readLine*.
1940-2070	*putByte*. Store the byte in *A* in the object file or object memory as appropriate – used by *writeLine*.
2090-2990	*readLine*. Read a line into the Basic program to be executed and sets the *chain, basicLine* and *eof* flags if necessary.
3010-3120	*writeLine*. Write (contents of *A*) bytes from the object buffer to the object file/memory.
3170-3260	FNinput. Print a prompt at a given screen address, and use a given default if Return is pressed, else use whatever is typed by the user.
3280	PROCdoke. Pokes two bytes at *addr,addr+1*.
3300-3340	PROCopenin. Open the given file for input, first closing any open input file. Poke the channel number into *scrChan,* giving an error if the new file can't be found.
3360-3390	PROCinitSrce. For a *MEM* source file, Poke the start address into *srcChan,* else call PROCopenin. For a Basic source file, read the initial cr (carriage return) byte.
3410-3460	PROCerror. Print an error string centred on the bottom line, then wait for Space to be pressed before erasing it.
3480	FNzp. Allocates *count* zero page locations, incrementing *zpPtr* accordingly.
3500	FNstrip. Strips leading spaces from the string *f$*.

From Page 105

Basic. For example, instead of using &FFEE we might have wanted to use the symbol *oswrch*. This could be defined at the start of the source using:

```
~oswrch=&FFEE
```

Note again that Basic-type source files can include absolutely any Basic token, whereas textual files may only include things which wouldn't be tokenised. So a Basic source file could contain:

```
1000 ~tilde=ASC"~"
```

but a textual source file would have to say:

```
~tilde=126
```

To use the program, type it in from the listing and save it. Note that line 1300 must have at least 80 spaces following the *[opt pass:*.

There mustn't be a space between the line number and the square bracket of the *opt* statement in line 1300.

Type RUN. You are now led through a series of prompts, which are explained below:

```
Source filename:
```

In response, type the name of the first (and possibly only) source file to be assembled. The default name *SOURCE* will be printed. If you want that, just press Return, otherwise type whatever you want and press Return.

The first character you type will cause the default to be deleted. This is in common with most of the prompts described below.

If you type *MEM* or *mem* as the filename, the source file will not be taken from a disc file, but from somewhere in memory. This could be a Basic program at some other value of PAGE, or a text file that you've *LOADed in.

On a 6502 Second Processor, for example, you could load the source in at

PROBLEM

WHEN I switch on my computer and I haven't tuned in to channel 36 lines appear on the screen. Please tell me why this happens. – Kirk McDowall, London N8.

SOLVED

If you haven't tuned the signal in properly some of the radio frequency energy is still passed through by the imperfect filters at the input of your TV.

As the signal is not tuned in the set is not synchronised, so the frame blanking periods are visible as moving lines. This happens with all TVs.

From Page 107

&C000 just above Basic II. If you specify a memory file, you are asked:

```
Address of source :
```

to which you should type the address in memory of the source code – hexadecimal values should start with an ampersand (&). Next comes:

```
Is the source BASIC ?
```

to which the default reply is Y for yes. Type Return if you want this, or N for no (in the case of a pure text file). The next prompt is:

```
Object filename :
```

The default is *OBJ*, and is the name of the file where you want the final object code to be stored. Again, you can type *MEM* or *mem* if you want the code to be assembled directly into memory, where it can be executed immediately. You are now asked for the:

```
Object file address :
```

The exact meaning of this depends on whether you are assembling to memory or not. If so, it means "where in memory do you want to object to be placed?". Otherwise, it means "what is the load address of the file?". The file's load attribute is set to this, and it is also the initial value of *P%* for the assembly.

The assembly now takes place. If there is an error, a normal Basic error message is printed, except that the name of the source file is printed in addition to the line number. You must list the program to see the incorrect line. For example:

```
No such variable at line 1300
                 in file SOURCE
```

If you are assembling to a file you are asked for the:

```
Execution address of object :
```

The only use of this value, which defaults to the object file start address, is to set the execution address of the object file. The value given is EVALed, so you can use an expression including labels defined in the program.

The program is part machine code and part Basic. The Basic part inputs the various names and addresses from the user and does the main assembly FOR loop.

The machine code reads a line of source, either from a file or memory, and pokes it into a long line of spaces in the program, where it is assembled. It also looks after the special lines starting with ˜ and outputs the object bytes, again, either to a file or memory.

Communication between the Basic and machine code is performed using a set of zero page locations. See adjoining panels for these, along with the rest of the main variables.

Full listing starts on Page 152

PROBLEM

I HAVE bought the Body Building Course kit to make the Talking Clock from the May 1985 issue of *Micro User*.

It would appear that somewhere in the making, the directions and I have parted company, or I have made some drastic error in typing in the program to set it up, for after completing the project for my school, disaster upon disaster. The whole things works perfectly, but . . . as the hands go forward, the time on the screen goes backwards!

This is causing a slight upset in my teaching, as you can well imagine. I have checked my typing but have found no errors.

I wonder if you could therefore suggest where I need to alter the software to make progress in the right direction. – T.G. Rhys-Davies, Avon.

SOLVED

If the time goes backwards you have got the two outer wires on the pots reversed. Just swap these over on the pots or at the D-type socket and the hands will drive it right.

PROBLEM

I OWN an Atari video touch pad and would like to connect it to my BBC Micro.

So far I have failed in my attempts to do so, as I have a very limited knowledge in this area. Therefore I would appreciate help in solving this problem.

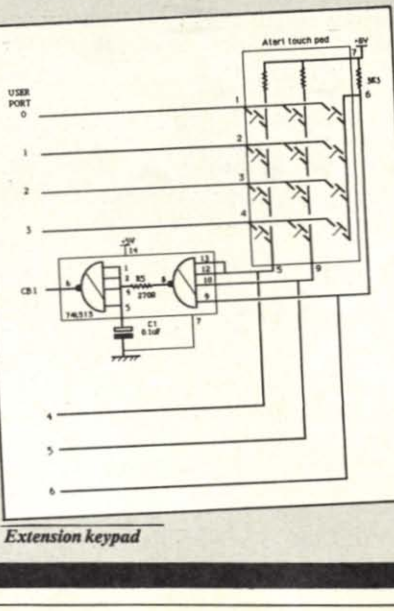
Also, in my local shops I have seen some Atari games paddles at a very low price. I was wondering if they could be plugged into a joystick interface and used on modified games. – A. Momin, London NW2.

SOLVED

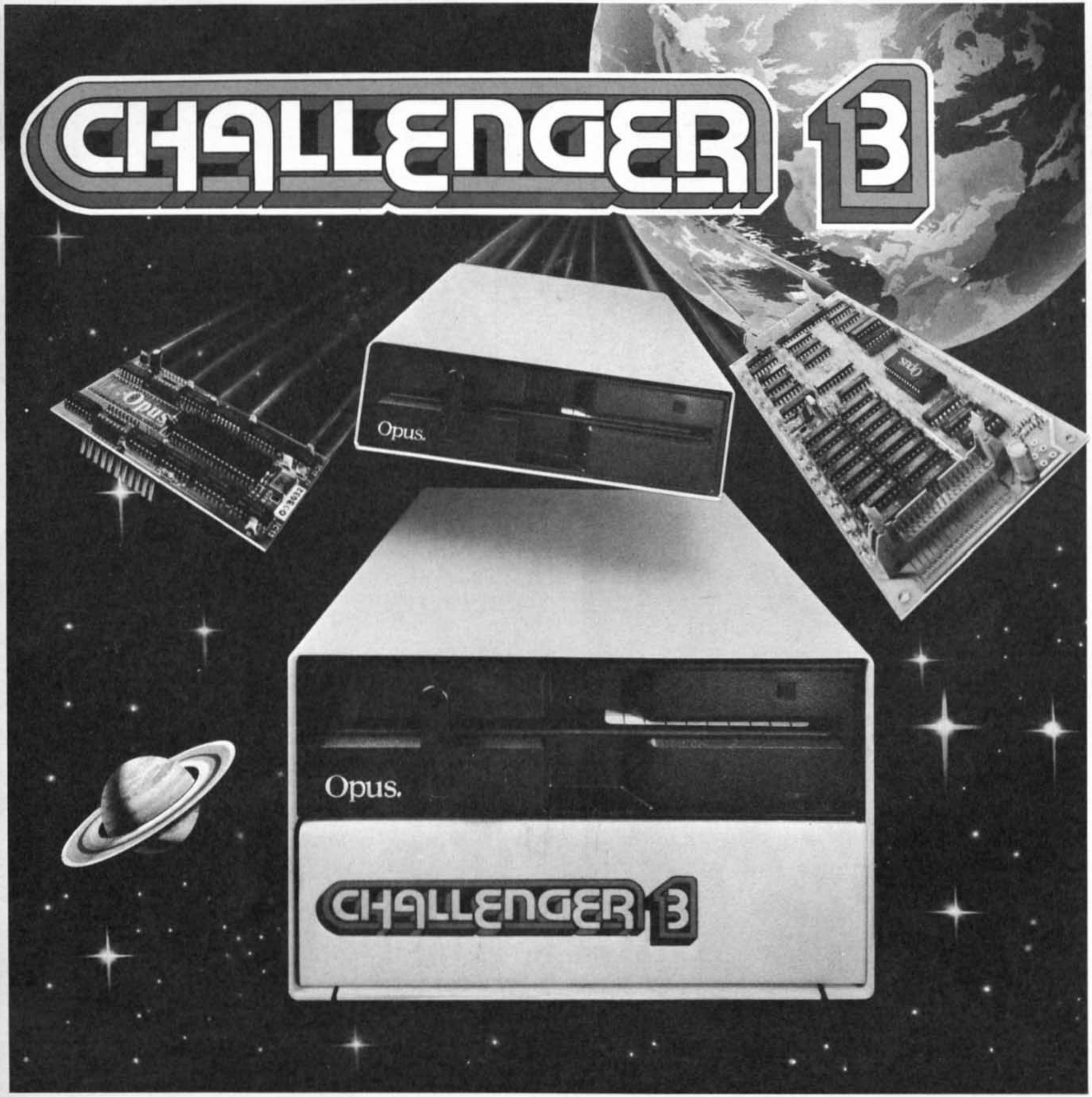
The touch pad is a matrix keypad like that described in the July 1985 Body Building article. If you add the extra components as shown on the diagram the same software driver should work as given in the article. The numbers on the touch pad refer to the 9 pin socket.

Atari joysticks are of switch type. A suitable interface was described in the May 1983 issue of The Micro User. Alternatively you could use the Track Ball interface No. 2 as described in the February 1985 Micro User with the modification of putting 3k resistors from each joystick output up to the 5 volt line.

In this way your games would not need modifying.



Extension keypad



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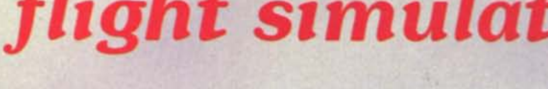

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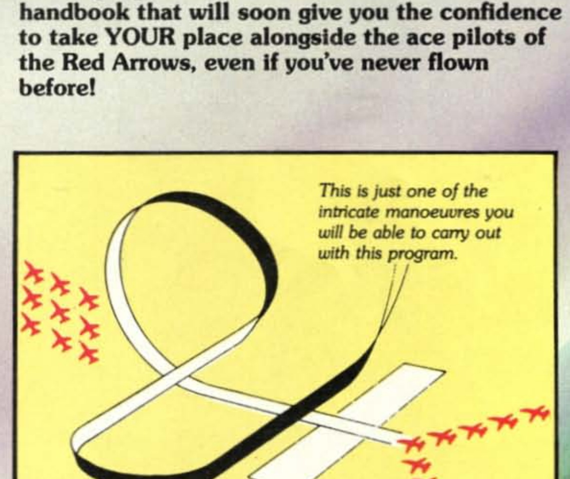

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– *Home Computer Weekly*

An animated discussion

Alice looks at alternative adventures – or is that alternative cheats?

ALTHOUGH this column normally deals only with pure adventure games – that is, puzzles set by text with only the occasional static pictures – there is an obvious and increasing trend toward animated games.

The puzzles are set via moving objects or scenarios, but the emphasis is still on logic rather than quick reactions or accurate timing on the joystick.

Two examples are Elite from Acornsoft and Castle Quest from Micropower, both of which require a certain amount of analysis in order to be successful. Another feature of such games is that you cannot cheat by looking at a listing, because actions not only speak louder than, but also don't use, words.

An animated adventure that requires a lot of logic and analysis is Ultimate's Alien 8. This game takes place aboard a starship, and your mission is to re-activate the sleeping passengers (shades of Kim Kimberly in Snowball) before you all crash into the destination star. To make things more difficult you have to contend with dozens of animated aliens and landmines, both of which kill you on contact.

What the game actually boils down to is a set of very clever variations on the theme of the banana that is just out of reach – even when you jump – so you have to collect and move objects to stand on in order to cross over a variety of fiendish obstacles and/or reach awkward, often moving platforms. The gimmick is that you do all this in three-dimensions.

There are 128 rooms, all beautifully drawn in perspective, of which about 100 contain some trap or obstacle to negotiate or overcome. The attraction for an adventurer is that many of these puzzles can be solved by analysis and patience. Quick reactions are not the only way.

For example, you encounter clockwork mice that wander about randomly. To get past them you just stand on a block you are carrying whenever they get too close and then run when the way is clear. This trick is particularly useful when you find a room containing both mice and mines – you merely wait on your block until the mice have cleared the room.

The demerit of the game is that the action slows down considerably when your "puppet" or a moving alien passes behind other objects. This is due to the overheads of hidden line removal, but it plays havoc with your timing, which is often critical.

I think the solution to this is the time-honoured rule "always make a map" and, having done so, work out the most efficient and safest route to visit the critical rooms.

D&D can be extremely elaborate, particularly in creating the character you play

Another "alternative adventure" is Combat or D&D (for Dungeons and Dragons) which some readers will have encountered, in a fairly simple form, when playing Level 9's Red Moon (reviewed last month).

I say simple because D&D can be extremely elaborate, particularly in creating the character that you play.

If you like this type of game then probably the best on offer is the Runemagic Adventure Series by Triffid Software. For just £6.95 you get a bargain of two games plus the vital Character Generator.

Readers of the Livingstone/Jackson series of Puffin books (Warlock of Fire Top Mountain and others) will be familiar with character generation – the throwing of dice to determine your strengths and skills.

In Runemagic there are six attributes to roll for: constitution, size, strength, intelligence, power and dexterity. These attributes are linked with the objects you can carry. For instance high power means that your spells are particularly effective, great strength helps you in hand-to-hand combat, a robust constitution helps you suffer and survive considerable abuse, and so on.

Apart from the character generation,

LETTERS

THIS month's survey is really a conglomeration from readers asking "Why don't you mention" such and such a game. First let me thank them for taking the trouble to write. I am always interested in your opinions.

Secondly I am finding it quite difficult to answer some of the queries. This is partly because I have seen about 100 games and have not solved half of them (and often forget the answers anyway) so in some cases the only answer I can give is: "I don't know either".

In this case I can only advise you to cheat, write to the manufacturer, or scan for clues in magazines with adventure columns.

PRIZE PUZZLE

PRACTICALLY all the alternatives discussed this month have one feature in common: they all have a variety of possible solutions – there is rarely just one single way to make progress – and all these solutions are hidden.

In such games the only way of cheating is to appreciate some of the limitations of the computer such as short memories or poor vision – hence the Battlefield cheat.

Another limitation is that computers cannot – yet anyway – reproduce themselves. This raised a classic question about 20 years ago, namely – can a program PRINT a copy of itself?

The answer to this is Yes, and Listing I, provided by Peter Derlien last month, is just such a program.

The puzzle this month is to try to write a program which performs this trick without using the RESTORE statement.

I confess that I have been unable to do this myself, so a proof that the program must use RESTORE would be an equally valid solution.

which is largely luck, you can also select between various weapons and armour and finally, as in Red Moon, choose spells that detect traps or treasure, allow you to teleport, repair battle damage and such like.

Needless to say, all this complexity of choice takes a while to set up before actually starting the game – where the more familiar GET, DROP, N, S, E, W commands take over – and, so far, I have not been very successful in my forays with various characters and choice of weapons and spells.

This can be a mite frustrating because I could have always cheated in the Livingstone/Jackson Fighting Fantasy series by simply assuming I could beat anyone and anything, but have found no way to fiddle this game.

Nevertheless, with what I have seen, plus more practice, I would hazard that this is the best D&D game available on the BBC Micro.

If, however, you want more realistic combat then you might try a war game. These programs have a number of similarities to an adventure in that you have to move objects – your forces – around a two-dimensional battlefield with the option to SAVE/RESTORE the situation at various times.

The essential differences, to my mind anyway, are that you are "in action" simultaneously in many places and the computer, playing the enemy, usually has the advantage in the number or deployment of forces at the beginning.

Nevertheless the computer is not intelligent, and the game can often be treated as a puzzle as you search for a weakness in its tactics or strategy.

I remember one game where the enemy airforce attempted to bomb one of my airfields but its 100+ bandits could be blocked by a single, well placed spotter plane.

In another game a win was judged by how many of my forces could survive a long period of battle against overwhelming odds, so I placed them in a corner of the screen display of the battlefield and the program could not find them.

Even more realistic flight simulations are coming on the market

A taste of such games can be obtained with BBC Soft's Battlefields which purports to simulate Waterloo and the American Civil War. Unfortunately the computer does not play – both games are for two people, each aware of his own forces' positions but having limited intelligence of his opponent's whereabouts.

Both give orders simultaneously and fighting then takes place if and when the forces meet. I don't think it will appeal to seasoned war games players because, without the program playing, there is nothing new – I found the game very dull playing it by myself – and the display of the units on the battlefield is rather crude. I'm sure the BBC Micro can do better than this.

Another "real" combat area that the BBC Micro can, and will, do better in this year is flight simulators. We've had Elite and Aviator for over a year now and even more realistic programs are coming on the market.

The best of these games simulate navigation – you can, apparently, fly over hundreds of square miles of hostile territory using radar to locate enemy targets and radio beacons to home in on friendly runways or aircraft carriers.

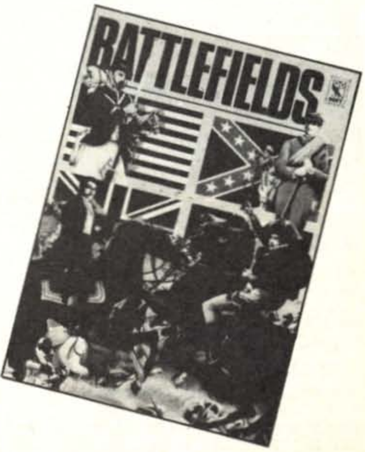
The best (most realistic) of these simulators give the information in digital rather than dial form. At first it is an achievement to take off, but after a couple of weeks a good player can make hour long flights and locate and perform almost everything in a pea soup fog and gale force winds – somewhat unlikely weather conditions even in an English summer.

Having shot down 100 aircraft in one mission the ace can then pretend that three of his four runways are Japanese flattops, happily machine gun or dive bomb them for an hour or so and then finally see how close to a radio beacon he can commit a Kamikaze attack.

Jump Jet from Anirog contains "the essential elements of a Harrier mission from the deck of an aircraft carrier". This includes VTOL plus locating and destroying enemy aircraft with your Sidewinder missiles.

The colour and detail of take off and

→



From Page 113

views over the heaving sea with clouds scudding by are very well done, but the flight plus interceptions are not.

For a start, you seem to get through about 1,000 pounds of fuel per minute, so no flight can last longer than a few minutes.

Another niggle is that when you fly away from the carrier your Jump Jet jumps randomly about five miles and, no matter what height or speed you try – even –20 knots – the enemy flies inexorably backwards at you. The only safe place is back on the carrier which, if approached correctly (to within two miles and speed less than 20 knots) also jumps into view for your attempt at landing.

The instructions on navigation say that, should you get further than 28 miles from the carrier, you should use a square search to relocate it. After many hours I still haven't managed to get more than 14 miles away before using up all four missiles and being destroyed by an enemy's jet exhaust.

A final type of adventure is where trick but logical questions are set. The best company for this type of game is Shards Software, who often include a mixture of such puzzles in their adventures.

The problem with those adventures containing tricky but logical questions is that it's difficult to wrap them in a scenario

The big problem is that they usually lack atmostphere because it is difficult to wrap them up into a scenario.

Examples of this are:

You meet a wizard who has a ring 1cm in width which he has made, so he says, by drilling a hole through a sphere of gold. He also says that, if gold weighs six ounces per cubic centimetre, you can have the ring if you tell him how much it weighs. The answer is exactly PI ounces, but just try proving that the radius of the original sphere is irrelevant.

If you can then here is a similar, more adventure-like puzzle:

You have found a very old and faded map of treasure island. All you can make out is the following: "Walk from the gibbet to the old oak tree, turn left, walk the same distance to point A and mark. Now walk from the gibbet to the great elm tree, turn right and walk the same distance to point B and mark. Dig halfway between A and B".

You sail to the island, but all you can find are two trees – the gibbet has rotted away. Prove that you can still find the treasure – that is show that the position of the gibbet, like the radius of the sphere, is quite irrelevant. Place it anywhere and the directions always lead to the same spot.

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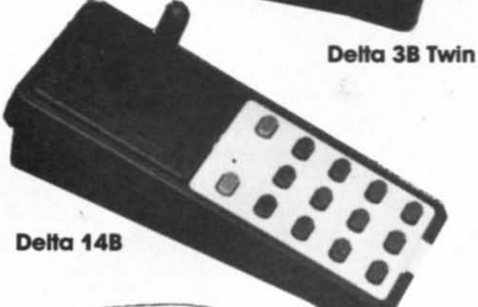

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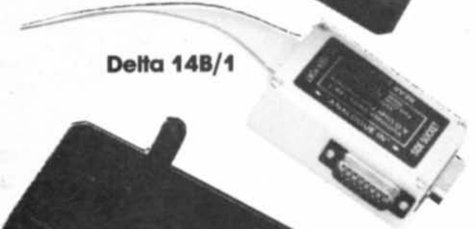

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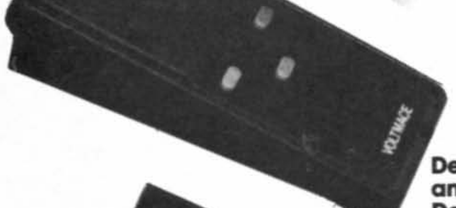

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Herts
SG7 6EW
Telephone (0462) 894410

BEEBUG RETAIL

BEEBUG SHOWROOM AND MAIL ORDER

The products in this price list are available in our showroom in St. Albans and by mail order. Telephone your order on 0727 40303 or send the order form to the address below. Alternatively come along and see us. We are open 9 - 5.30 Mon - Sat, and there is ample parking at the rear of our premises.

We take both Access and Visa credit cards. Simply telephone us on our multi-line telephone number 0727 40303 quoting: Cardholder's Name, Cardholders Address, Cardholder's Telephone number, Credit Card number, expiry date, order details.

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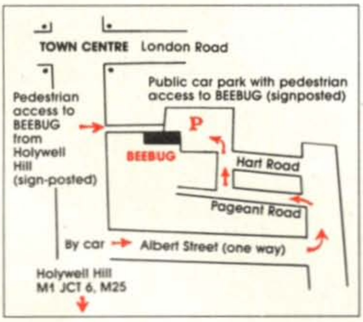
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M1 JCT 6, M25

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St. Albans, Herts. AL1 1EX
Tel: 0727 40303 — Multi-lines

- Computers
- Printers
- Monitors
- Disc Drives
- Budget Discs
- Software

COMPUTERS

BBC B Plus. There are two versions of this machine, the standard 64K with shadow screen memory at £459, and a 128K model at £489 with a special Basic and 64K user ram available for programs!

Disc Interface Upgrades. The Advanced Disc Filing System (ADFS) is now available, it requires the 1770 disc controller upgrade to be fitted. The ADFS offers some 60% increase in data storage and a large number of files per disc. The 1770 controller has built-in Format and Verify routines so you don't need any special utilities disk.

Second Processors. At £199 the 6502 second processor remains the best way of adding memory, whether it's to preview text in 80 coloumns or increase spreadsheet size. Special disc based versions of Wordwise Plus and Intersheet are available at £6.50 to fully utilise the extra space, although you must have the rom fitted to use them.

Disc Interface Offer. We are proud to be able to continue our very special offer of an Acorn 1.2 DNFS disk interface kit at £89. We are also continuing our offer of the Disk System Starter Pack (1.2 DNFS interface, Cumana 100K Drive, Disc Manual & 10 Beebug Discs) all for just £179.

Code	Description	Price inc. VAT
0202	BBC B Plus Computer	**459.00**
0220	BBC B+ with Econet	**499.00**
0221	BBC B+ 128K	**489.00**
0203	'6502' 2nd Processor	**189.00**
0204	'Z80' 2nd Processor	**389.00**
0205	Acorn Prestel Adaptor	**129.00**
0206	Acorn Teletext Adaptor	**139.00**
0210	A to B Upgrade Kit	**69.00**
0212	Acorn Speech Upgrade	**46.00**
0209	1.2 DNFS Rom	**19.50**
0217	1770 Disc Controller Upgrade Kit	**49.00**
0218	ADFS Rom for 1770 DFS	**29.00**
0213	Watford DFS Rom and Manual	**26.50**
0214	Watford DDFS Rom + Manual	**98.00**
0216	Watford DFS Manual	**6.95**
0219	Watford DFS Kit	**85.00**
0223	Acorn 1.2 DNFS upgrade	**89.00**
0222	Disc System Starter Pack	**179.00**

DISC DRIVES

We can again offer the entire range of Cumana disk drives from stock. The 800k CD800S remains probably the best value drive available and has stood up to tremendous punishment in the Beebug offices.

Code	Description	Price inc. VAT
0600	Cumana 100K CSX100 40T	**97.00**
0610	Cumana 100K CS100 40T	**127.00**
0601	Cumana 200K CDX200 40T	**187.00**
0602	Cumana 400K CSX400 40/80T	**113.00**
0603	Cumana 400K CS400 40/80T	**133.00**
0604	Cumana 800K CD800S 40/80T	**252.00**
0605	Watford 200K CLS200 40T	**97.00**
0606	Watford 400K CLS400S 40/80T	**133.00**
0607	Watford 400K CS400S 40/80T	**149.99**
0608	Watford 800K CD800S 40/80T	**270.00**
0650	Memorex Discs S/S D/D 48TPI 3481	**15.50**
0651	Memorex Discs D/S D/D 96TPI 3501	**25.50**
0652	Memorex Disc Head Cleaning Kit	**9.65**
0653	Library Case — 10 discs	**2.25**
0654	Disc Storage box — 50 discs	**9.00**
0655	Lockable Disc Box (35)	**13.80**
0656	Lockable Disc Box (80)	**17.25**
0657	10× 48TPI SS DD Discs + Free Box	**14.40**
0658	10× 48TPI DS DD Discs + Free Box	**20.00**
0659	10× 96TPI SS DD Discs + Free Box	**20.00**
0660	10× 96TPI DS DD Discs + Free Box	**21.40**
0661	25× 48TPI SS DD Discs + Free Box	**33.90**
0662	25× 48TPI DS DD Discs + Free Box	**45.19**
0663	25× 96TPI SS DD Discs + Free Box	**45.19**
0664	25× 96TPI DS DD Discs + Free Box	**48.90**
0665	50× 48TPI SS DD Discs + Free Box	**58.30**
0666	50× 48TPI DS DD Discs + Free Box	**81.40**
0667	50× 96TPI SS DD Discs + Free Box	**81.40**
0668	50× 96TPI DS DD Discs + Free Box	**92.49**

OTHER HARDWARE

Roms and Rams. The 2762 8k EPROM is still just £2.30, with the 27128 16k version at £3.45. "Shadow" RAM to increase user memory in Modes 0 to 6 can be added with either the Aries B32 RAM Board or the Watford 32K RAM Card, which can live in the machine together with most of the popular ROM expansion boards.

Joysticks. Joysticks are just the thing to make use of the best in Games software and now also increasingly used in more serious applications. The Voltmace 3Bs are popular and robust and the added keypad on the 14b has a host of interesting possibilities.

Code	Description	Price inc. VAT
0700	Aries B20 RAM Card	**86.50**
0701	Aries B32 RAM Card	**91.00**
0702	Watford 32K RAM Card	**69.00**
0703	AMX Mouse	**79.95**
0704	ATPL Sidewise ROM Board	**39.00**
0705	2764 8K eprom	**2.30**
0706	27128 16K eprom	**3.45**
0707	6264 8K ram	**7.50**
0708	Eprom Extractor	**5.00**
0709	Eprom Eraser	**32.20**
0710	Softlife Eprom Blower	**75.90**
0711	Nightingale Modem	**120.00**
0712	Pace Commstar	**33.00**
0713	Phone 2 into 1 adaptor	**6.32**
0714	BBkey Function Key Labels	**2.00**
0717	Watford Sideways ZIF	**17.25**
0718	Voltmace Delta 3B Single Joystick	**11.99**
0719	Voltmace Delta 3B Twin Joystick	**19.95**
0720	Voltmace Delta 14B Joystick/Keypad	**14.95**
0721	Voltmace Delta 14B/1 Interface	**14.85**
0722	13 amp 4-way plug block Extension	**10.35**
0724	Antex CN17 Soldering Iron	**6.79**
0726	8 way DIP switch	**0.98**
0727	RS423 domino plug	**0.46**
0728	RGB 6 pin DIN plug	**0.46**
0729	Cassette 7 pin DIN plug	**0.30**
0730	3-core 6 amp Mains Cable (per m)	**0.35**
0731	4-core RS423 Cable (per m)	**0.20**
0732	6-core RGB or Cassette Cable (per m)	**0.25**
0733	Safebloc Test Connector	**11.50**
0734	BBC Replacement Keyboard	**46.00**
0735	ATPL Battery Backup kit	**17.00**

MONITORS

Colour Monitors. Visitors to our showroom have been bowled over by the astonishing resolution and rock-steady image of both graphics and 80 column text of the Sanyo 3115 Ultra High Resolution Colour Monitor. The Philips CT2007 Colour TV + RGB Monitor also offers superb value and can easily resolve 80 column text.

Monochrome Monitors. Our Kaga 1203 Amber Screen Monitor is proving a real winner. Very easy on the eyes, even after many hours use.

Code	Description	Price inc. VAT
0500	Kaga 1201 G Hi-res Green	**103.50**
0501	Kaga 1202G Ultra Hi-res Green	**120.75**
0502	Kaga 1203A Ultra Hi-res Amber	**120.75**
0503	Zenith 123 12" Green	**75.90**
0530	Microvitec 1431 Med-res Monitor	**218.50**
0531	Microvitec 1451 Hi-res Monitor	**276.00**
0532	Philips CT2007 14" TV Monitor	**225.00**
0533	Sanyo Very Hi-res 14" Monitor 3115	**449.00**
0550	1.0m Monitor Lead RGB	**5.75**
0551	1.0m Monitor Lead BNC Zenith/Kaga	**3.45**
0552	Single Plinth for Monitor/Printer	**12.65**
0553	Double Plinth for Monitor	**21.85**
0554	Memorex TV and VDU Cleaning Kit	**4.51**

SOFTWARE

New BEEBUGSOFT releases. We continue to expand our range of software with our own new version of "Toolkit" and our new "Romit". "Studio 8" is becoming a very popular music processor package and "IconMaster" is intriguing everyone! See our software leaflet for details of these and other releases.

Other New Releases. From AcornSoft we now stock ViewStore, which is rapidly proving a useful database package. The View Printer Driver Generator package replaces the old printer drivers and does a whole lot more. The Graphics Extension ROM, which at last puts all those "unused" PLOT and DRAW commands to spectacular use makes an ideal gift for someone at Xmas or for yourself at any time!

Code	Description	Price inc. VAT
1000	Acornsoft View	**53.00**
1001	Acornsoft View Sheet	**53.00**
1019	Acornsoft View Store	**53.00**
1002	Acornsoft Hi-View	**55.00**
1003	Acornsoft Lisp Rom	**49.00**
1004	Acornsoft BCPL	**56.00**
1005	Acornsoft Comal	**49.00**
1006	Acornsoft Logo	**69.00**
1007	Acornsoft ISO Pascal	**69.00**
1008	Acornsoft Basic Editor	**29.00**
1009	AMX Desk	**21.95**
1010	AMX Utilities	**13.45**
1011	BBCsoft UltraCalc 2	**75.00**
1012	Acornsoft Elite Disc Version	**17.00**
1013	View Printer Driver Generator Cassette	**9.90**
1014	View Printer Driver Generator Disc	**11.50**
1015	Revs Disc	**17.00**
1016	Aviator Disc	**17.00**
1100	Wordwise Plus	**52.90**
1112	Hi Wordwise Plus Disc	**6.50**
1102	Wordwise	**35.00**
1106	Accelerator	**58.90**
1109	Disc Doctor	**28.00**
1103	C.C. Graphics ROM	**28.00**
1110	Intersheet	**51.35**
1111	Hi Intersheet Disc	**6.50**
1104	Printmaster (Epson)	**28.00**
1105	Printmaster (Star)	**28.00**
1107	C.C. Speech ROM	**30.00**
1108	Acorn Speech Processor (with 1107)	**10.00**
1118	White Knight Mk 12 Disc	**19.00**
1119	White Knight Mk 12 Cassette	**9.50**
1017	Graphics Extension Rom B	**29.00**
1018	Graphics Extension Rom B+	**29.00**
1114	Interchart	**29.00**

PRINTERS

Letter Quality. The Juki 6100 Daisywheel printer remains super value for applications demanding true letter-quality printing.

Colour Printers. The Canon PJ1080A Full Colour printer continues to amaze even Beebug staff with the brilliance and range of colour it can provide. Our new "Dumpmaster" ROM contains all you need to drive it for suberb colour screen dumps. We also stock the new Epson JX80 Colour Matrix Printer which is also capable of high speed listings.

Plotmate Offer Continues. The Linear Graphics Plotmate continues to be a very popular plotter and we are happy to announce that we can continue to offer this at the very special price of £333.50.

Kaga/Taxan & Canon PW1080A. These printers are proving very popular and we can now offer a package providing virtually instant access to at least EIGHT new NLQ Fonts for these machines. The remarkable FONTAID will be in stock by the first week in December but, at the time of going to press, we don't have firm prices. Please ring us for details.

Printer Accessories. Due to the costs of sending our Printer Paper through the post we must charge a carriage of £2 per box, in addition to normal carriage charges. The price of £14.50 is for single boxes and, as with all our goods, we would be pleased to quote to schools and industry for larger quantities.

Code	Description	Price inc. VAT
0300	Brother HR 15 Daisywheel	**373.75**
0301	Canon PW1080A 10"	**340.00**
0302	Canon PW1156A 15"	**405.00**
0303	Canon PJ1080A colour	**460.00**
0304	Epson LX 80	**270.00**
0305	Epson RX 100	**392.00**
0306	Epson FX 80	**362.00**
0307	Epson FX 100	**490.00**
0308	Epson JX 80 colour	**569.00**
0309	IBICO LTR1 Letter Quality	**138.50**
0310	Juki 6100 Daisywheel Printer	**359.00**
0311	Kaga KP 810	**263.35**
0312	Linear Graphics Plotmate	**333.50**
0313	LX80 Tractor Feed Unit	**23.00**
0400	2m Printer Lead	**10.00**
0401	Platen Cleaner Kit	**6.00**
0402	Epson FX80/RX80 Ribbon	**5.00**
0403	Epson FX100/RX100 Ribbon	**10.00**
0404	Juki 6100 Replacement Daisywheel	**20.50**
0405	Brother HR-15 Daisywheel	**20.50**
0406	11"×9.5" P/Paper (2000 sheets)	**14.50**
0407	3.5"×1.44" Labels (1000 approx)	**5.00**
0408	Canon PW/Kaga Taxan Ribbon	**6.79**
0411	HR-15 Correctable Ribbon	**4.30**
0412	HR-15 Nylon Ribbon	**4.30**
0413	LX 80 Replacement Ribbon	**5.50**
0414	Ibico Ink Roller	**4.60**
0415	Epson JX80 Ribbon	**14.95**
0418	Juki 6100 Ribbon	**1.55**

ORDER FORM

CARRIAGE. Please **add £1.00** carriage to all orders except Computers, Monitors, and Printers **add £7.00** per item. Disc Drives, 2nd Processors, Modems etc. **add £5.00** per item. Listing Paper **add £2.00** per box.

BEEBUG MAIL ORDER
Dolphin Place, Holywell Hill,
St. Albans, Herts. AL1 1EX
(Dolphin Place is opposite
18 Holywell Hill in the centre
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ADDRESS:
POSTCODE:

SUB TOTAL £
CARRIAGE £
TOTAL £

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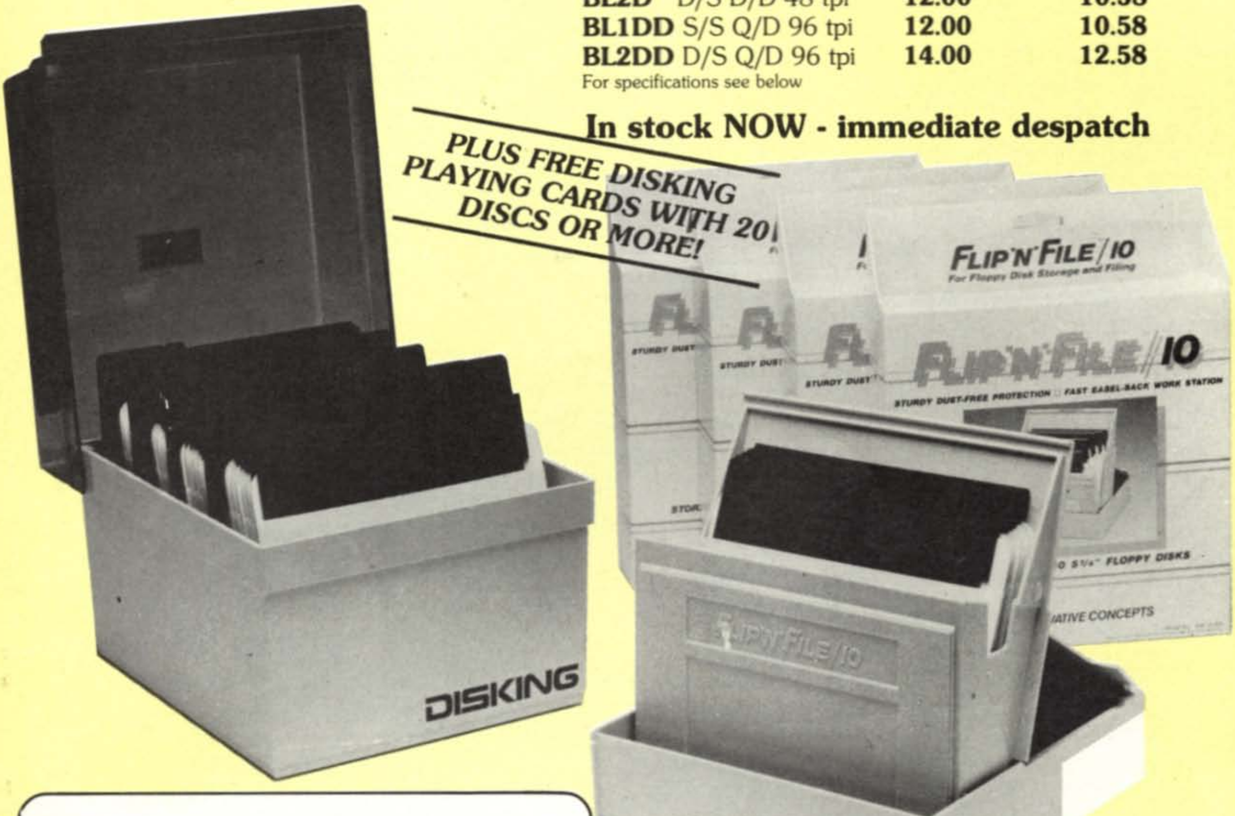

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1DD S/S 96 tpi	23.90	**21.90**	20.90	19.90	18.90
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D2D D/S 48 tpi	17.90	**15.90**	15.40	14.90	14.40
D1Q S/S 96 tpi	17.90	**15.90**	15.40	14.90	14.40
D2Q D/S 96 tpi	22.90	**20.90**	19.90	19.40	18.90

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DM1D S/Sided 0.5Mb	24.90	**22.90**	21.90	20.90	19.90
DM2D D/Sided 1.0Mb	34.90	**32.90**	31.90	30.90	29.90

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550-01 D/S 48 tpi	23.90	**21.90**	20.90	19.90	18.90
577-01 S/S 96 tpi	23.90	**21.90**	20.90	19.90	18.90
557-01 D/S 96 tpi	26.90	**24.90**	23.90	22.90	21.90
IBM PC AT (HIGH DENSITY)					
MDHD D/S 1.6MByte	34.90	**32.90**	31.90	30.90	29.90

3½" DISKS Prices & Qtys relate to **ten-packs**

PRICES EXC VAT	1	2-4	5-9	10-19	20+
MF350 S/Sided 0.5Mb	29.90	**27.90**	26.90	25.90	24.90
MF360 D/Sided 1.0Mb	39.90	**37.90**	36.90	35.90	34.90

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200-01 S/S D/D 48 tpi	15.90	**13.90**	13.40	12.90	12.40
250-01 D/S D/D 48 tpi	17.90	**15.90**	15.40	14.90	14.40
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257-01 D/S D/D 96 tpi	19.90	**17.90**	17.40	16.90	16.40

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PRICES EXC VAT	1	2-4	5-9	10-19	20+
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5220 D/S 48 tpi	23.90	**21.90**	20.90	19.90	18.90
5410 S/S 96 tpi	24.90	**22.90**	21.90	20.90	19.90
5420 D/S 96 tpi	28.90	**26.90**	25.90	24.90	23.90

IBM PC AT (HIGH DENSITY)

Prices and quantities relate to **ten-Packs**

PRICES EXC VAT	1	2-4	5-9	10-19	20+
5660 D/S 1.6MByte	41.90	**39.90**	38.90	37.90	36.90

3½" DISKS Prices & Qtys relate to **ten-packs**

PRICES EXC VAT	1	2-4	5-9	10-19	20+
6100 S/Sided 0.5Mb	29.90	**27.90**	26.90	25.90	24.90
3460 D/Sided 1.0Mb	39.90	**37.90**	36.90	35.90	34.90

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PRICES EXC VAT	1	2-4	5-9	10-19	20+
104/1D S/S 48 tpi	22.90	**20.90**	19.90	18.90	17.90
104/2D D/S 48 tpi	29.90	**27.90**	26.90	25.90	24.90
204/1D S/S 96 tpi	29.90	**27.90**	26.90	25.90	24.90
204/2D D/S 96 tpi	34.90	**32.90**	31.90	30.90	29.90

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UK Shipping Rates exc VAT

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A judgement of errors

KEVIN EDWARDS continues his series on the 8271 floppy disc controller

LAST month I introduced you to the 8271 Floppy Disc Controller. Now we'll be looking more closely at the command set and disc errors associated with this chip.

Before any disc can be used it must be formatted. The formatting process involves initialising concentric tracks on the disc's surface with special magnetic marks so that the 8271 can store information on it. The number of tracks depends on the disc drive being used.

As you will be aware, the disc drives for the BBC Micro can be either 40 or 80 track – or both if you're rich enough to have switchable drives. Each track is split into 10 blocks, each 256 bytes in size. These blocks are known as sectors and are used to store programs and data.

The tracks are numbered sequentially from 0 to 39/79 – 0 being the outermost one. Each of the 10 sectors – number 0 to 9 – has an identification field, ID field for short, which the 8271 uses to distinguish between the sectors on the track, rather like cassette file block headers.

The ID field contains the information shown in Table I.

The sector IDs for the first two tracks of a standard Acorn disc are given in Figure I.

Only two values change, the track and sector numbers, R and C. The head address, H, and the sector size, N, are always the same.

The sector ID fields are sent to the disc during formatting. We'll see how to use the format command later on.

Figure II shows the contents of each track after the 8271 has formatted it. It looks complex at first glance, but all will be revealed.

The total number of bytes that each track can hold is 3125. This includes the data and ID fields, the various gaps and the CRC bytes – Cyclic Redundancy Check. If you exceed the 3125 byte limit the data at the start of the track will be overwritten.

Description		Typical values for Acorn format
Track number	C	0 to 39/79
Head address	H	0 - not used
Sector number	R	0 to 9
Sector length	N	1 128*2^N bytes
ID CRC		? 16 bit number

Table I: ID field

The data fields are where the data is actually stored. The sector size can be 128, 256, 512, 1024 or 2048 bytes in size – the Acorn system uses 256-byte sectors. Each data field has two associated CRC bytes. The CRC bytes are updated each time a sector is written to the disc.

The gap bytes are used to separate the different sections of information on the disc, rather like the interblock gaps used by tapes. The size of Gaps 1 and 3 are specified at the time of formatting – both usually 22 bytes.

Gap 2 is always the same and consists of 11 &FF bytes followed by 6 &00 sync bytes.

Gap 4 ensures that each track contains 3125 bytes – the maximum capacity of each track. It does this by filling the remainder of the track with &FFs.

```
C H R N   C H R N

0 0 0 1   1 0 0 1
0 0 1 1   1 0 1 1
0 0 2 1   1 0 2 1
0 0 3 1   1 0 3 1
0 0 4 1   1 0 4 1
0 0 5 1   1 0 5 1
0 0 6 1   1 0 6 1
0 0 7 1   1 0 7 1
0 0 8 1   1 0 8 1
0 0 9 1   1 0 9 1

Track 0   Track 1
```

Figure I: Sector IDs for tracks 0 and 1

Sectors can be written with what is known as "deleted data". Just before the sector data is a byte known as the Data Address Mark. This indicates the type of data stored in the sector – the data isn't any different but the data mark pretends it's a special, protected sector.

If the address mark is &F8 the sector contains deleted data and is therefore treated in a special way. We'll discuss deleted data in more detail next time.

Both the data and ID fields have 2 CRC bytes. The Cyclic Redundancy Check – CRC – is a very sensitive type of checksum which can detect single or multi-bit errors in a block of data.

Whenever a sector is read the CRC is re-calculated and compared with the CRC bytes on the disc. If the two don't match, a Data CRC (&E) or ID CRC (&C) error is generated and the command is aborted.

So far I've concentrated on the standard Acorn disc format. There's nothing to stop you having two, 512-byte sectors on each track. The only problem is that you won't be able to read or write data unless you use OSWORD &7F.

After any 8271 command has been executed the result of the operation must be examined to see if any error has occurred. Here's a few points worth noting about disc errors.

Leaving discs near strong magnetic fields can be responsible for many different error messages. So if you keep your discs near loudspeakers or "bell" telephones, move them!

Using a 40 track disc in an 80 track

drive and vice-versa can also be the source of unexpected errors. Before you re-format or destroy a "faulty" disc make sure the disc and drive match. You can easily be fooled into believing a disc is faulty under these circumstances because both 40 and 80 track discs, in the wrong type of drive, can be catalogued without error.

This is because track 0, which contains the directory, is in the same place on both 40 and 80 track discs.

If you repeatedly get the same error on all your discs then the fault will almost certainly be with your hardware. If this is the case you should check that both your drive and disc interface are installed and connected correctly. See Appendix H of the Advanced User Guide for information on installing single density disc interfaces.

It sometimes happens that a program saved on one disc drive will not load on another, even though the drives and interfaces are identical on the two machines.

This is because the read/write heads are aligned slightly differently on the two drives, making them incompatible. It is possible to have the heads re-aligned but this can be expensive. Even then you can have problems when you try using your discs on other drives.

Below is a list of the most common errors and reasons for their occurrence. The errors repeat with bit 5 set (+ &20) indicating that deleted data was also located at the time of the error. Other error types exist but should never occur as they are only relevant when other hardware is present.

***0 – No error:** The 8271 has successfully executed the last command without any problems.

***8 – Clock error:** A clock error would suggest that the disc has been corrupted in some way. Putting your discs near strong magnetic fields could be responsible for this outcome. If this occurs, you should recover as much as you can from the disc and re-format it. This is true for any disc that corrupts.

***&A – Late DMA:** For some reason the interrupt handling routine in page &D was too slow in accepting/sending a byte from/to the 8271. This occurs when location &FE84 is not accessed quickly enough during a data transfer interrupt – timing is critical.

This error is very rare and would suggest a hardware fault if it repeats.

***&C – ID CRC:** A sector IDentification header has been upset in some way. This means that the Cyclic Redundancy Check – CRC – bytes for the ID field do not match the ID field data. If the ID or Data CRC errors keeps occurring on one particular disc, and not others, you should discard it as it indicates that the disc is physically faulty.

***&E – Data CRC:** This is the most common error that can occur. Basically it means the Data CRC bytes don't agree with the data in the sector. This is the disc equivalent of the tape error "Data?" but is much more fatal – your disc drive doesn't have any volume and tone controls to alter. Your best bet is to re-format the disc and start again.

***&10 – Drive not ready:** Opening and closing the drive door while a disc is being accessed can cause this error. Repeated drive not ready errors would be due to a hardware failure.

***&12 – Disc write protected:** An attempt has been made to write to a disc which has its write protect notch covered. The 8271 will never write to a disc which has been write protected. If you cannot write to ANY disc your drive/interface is faulty.

***&14 – Track 0 not found:** Seeking the read/write head to track 0 has failed. If you get this error you should check your drive/interface as they are almost certainly faulty.

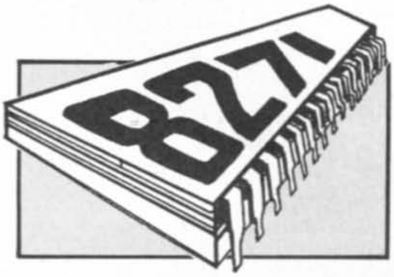
***&16 – Write fault:** During a write operation the 8271 was upset by something and aborted the command. After such a fault you should check the connection cable between the drive and micro as this is a common cause.

***&18 – Sector not found:** This is the second most common error you'll encounter. It occurs when a sector ID field cannot be found. Attempting to read an un-formatted track/disc is a classic case when this error will be generated.

Probably the most common cause of this error is when a 40 or 80 track disc is used in the wrong type of drive. That is, an 80 track disc in a 40 track drive and vice-versa.

Now it's time to examine the many different commands that the 8271 has.

As we saw last month, OSWORD



Gap 1	22	&FF bytes	
	6	&00 sync bytes	
Sector 1	1	ID address mark	
ID Field	1	Track address	C
	1	Head address	H
	1	Sector number	R
	1	Sector length	N
	2	ID CRC bytes	
Gap 2	11	&FF bytes	
	6	&00 sync bytes	
Data Address Mark	1	byte	
Data Field	128*2^n	bytes (256 bytes for Acorn format)	
Data Field CRC	2	CRC bytes	
Gap 3	22	&FF bytes	
	6	&00 sync bytes	
Sector 2	1	ID address mark	
ID Field	1	Track address	C
	1	Head address	H
	1	Sector number	R
	1	Sector length	N
	2	ID CRC bytes	
Gap 2	11	&FF bytes	
	6	&00 sync bytes	
Data Address Mark	1	byte	
Data Field	128*2^n	bytes	
Data Field CRC	2	CRC bytes	
Gap 3	22	&FF bytes	
	6	&00 sync bytes	
....	...	and so on for	
....	...	another 8	
....	...	sectors	
Last Data Field	128*2^n	bytes	
Gap 4	???	&FFs to fill the track so that it contains 3125 bytes	

Figure II: Track contents after formatting

→

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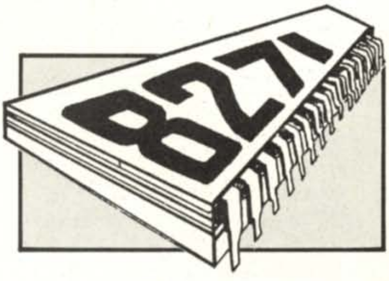

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&7F is used to program the 8271. Once an OSWORD call has been executed the selected drive is turned on, the command and parameter bytes are sent to the 8271, and the result byte is stored at the end of the OSWORD control block.

You should also note that a seek to track 0 should be executed before each sequence of OSWORD &7F calls to tidy up the 8271.

All we need now is the command and parameter byte meanings for each command.

Well here's a few to start with. *(Parameters with &— next to them indicate where you must specify data.)*

Format a track:

Data transfer does occur.

Command	&63
Parameters (n)	5
Param 1 – Track Address	&—
Param 2 – Gap 3 size minus 6	&10
Param 3 – Record Length/Sector size	&—
Param 4 – Gap 5 size (un-used)	0
Param 5 – Gap 1 size minus 6	&10

The format command initialises a track with magnetic marks so that it can be used to store data. The gap sizes should all be &10, except Gap 5 – which is 0 – as this is not used by mini-floppy discs. In fact, the gap size specified is 6 less than the gap size written to the disc.

The only two parameters you need to alter are the track address and the record length/sector size. The latter uses one byte to specify two things. Bits 0 to 4 indicate the number of sectors to be formatted on the selected track and bits 5 to 7 specify the size of the sectors in bytes.

Bit 7	Bit 6	Bit 5	Sector size
0	0	0	128
0	0	1	256
0	1	0	512
0	1	1	1024
1	0	0	2048
1	0	1	4096
1	1	0	8192
1	1	1	16384

Figure III: Bit patterns for each sector size.

The bit patterns for the sector sizes are given in Figure III.

Formatting a track with more than 3125 bytes will cause the sector IDs at the start of the track to be destroyed – in other words the track is un-formatted. Therefore, the maximum sector size you should use is 2048 bytes.

Figure IV lists the maximum number of sectors per track for each sector size.

Maximum number of sectors	Sector size in bytes
18	128
10	256
5	512
2	1024
1	2048

Figure IV: Sectors per track

Once the format command has been issued the 8271 will require the ID field data for the current track. For each sector there must be four bytes – C,H,R and N. Figure I shows the 80 bytes needed for tracks 0 and 1. The buffer address in the OSWORD control block must point to the start of the C,H,R,N list.

You should also note that the format command does not verify the data on the track. After each format operation you should verify the track to ensure the disc was successfully formatted.

Program I is a simple routine to format a 40 track disc with five, 512byte sectors. You won't be able to catalogue it because the DFS only uses 256byte sectors, but it demonstrates how to use the format command using OSWORD &7F.

Seek read/write head:

No data transfer.

Command	&69
Parameters (n)	1
Param 1 – Track address	&—

The seek command moves the read/write head to the track address specified. No data is transferred. A seek to track 0 should always be executed before a batch of OSWORD &7F calls are issued.

● *That's enough for this month. Next time we'll look at the rest of the commands.*

```
   10 REM 5 * 512 byte sector format
   20 REM By Kevin Edwards
   30 REM
   40 osword%=&FFF1
   50 CHRNblock%=&FFFF0C20
   60 oswordblock%=&FFFF0C00
   70 REM Read the CHRN data
   80 FOR chrn%=0 TO 19
   90 READdata%
  100 ?(CHRNblock%+chrn%)=data%
  110 NEXT chrn%
  120 REM *************************
  130 REM Seek read/write head to
  140 REM track 0.
  150 REM *************************
  160 REM Select Drive 0
  170 ?oswordblock%=0
  180 REM buffer address =&FFFFFFFF
  190 REM indicating that no data is
  200 REM transfered during seek.
  210 !(oswordblock%+1)=&FFFFFFFF
  220 REM Number of additional
  230 REM parameters needed for a see
k
  240 REM command.
  250 oswordblock%?5=1
  260 REM The command byte for seek
  270 oswordblock%?6=&69
  280 REM The first parameter is the
  290 REM track address.
  300 oswordblock%?7=0
  310 REM Now execute OSWORD &7F
  320 A%=&7F
  330 X%=oswordblock% MOD 256
  340 Y%=oswordblock% DIV 256
  350 CALLosword%
  360 REM Now check if an error has
  370 REM occured.
  380 IF oswordblock%?8<>0 THEN PRINT
''"Disc error ";~oswordblock%?8:END
  390 REM *************************
```

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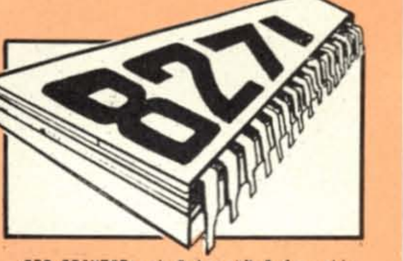
```
400 REM Now set up the OSWORD block
410 REM for format.
420 REM **************************
430 REM Select Drive 0
440 ?oswordblock%=0
450 REM buffer address =CHRNblock%
460 REM this points to the ID
470 REM field data.
480 !(oswordblock%+1)=CHRNblock%
490 REM Number of additional
500 REM parameters needed for the
510 REM format command.
520 oswordblock%?5=5
530 REM The command byte for format
540 oswordblock%?6=&63
550 REM The track number. This is
560 REM incremented after each
570 REM track is formatted.
580 oswordblock%?7=0
590 REM Gap 3 =&16 (-6 in the
600 REM format block).
610 oswordblock%?8=&10
620 REM Record length/size for 5,
630 REM 512 byte sectors.
640 oswordblock%?9=&45
650 REM Gap 5 =0 - unused
660 oswordblock%?10=0
670 REM Gap 1 =&16 (-6 in the
680 REM format block).
690 oswordblock%?11=&10
700 REM **************************
710 REM Now begin formatting the
720 REM tracks.
730 REM **************************
740 FOR track%=0 TO 39
750 REM Change track number (C)
760 REM for next track.
770 FOR nexttrack%=0 TO 16 STEP 4
780 ?(CHRNblock%+nexttrack%)=track%
790 NEXT nexttrack%
800 REM Change track number in the
810 REM OSWORD block.
820 oswordblock%?7=track%
830 REM Execute the OSWORD.
840 CALLosword%
850 REM Test for error.
860 IF oswordblock%?12<>0 THEN PRIN
T''"Disc error ";~oswordblock%?12:END
```



```
870 PRINT"Track ";track%;" formatte
d"
880 NEXT track%
890 PRINT''"Disc formatted !!"
900 END
910 REM C H R N data for 5, 512
920 REM byte sectors.
930 DATA0,0,0,2
940 DATA0,0,1,2
950 DATA0,0,2,2
960 DATA0,0,3,2
970 DATA0,0,4,2
```

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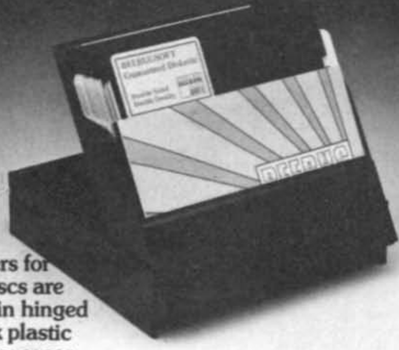

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BEEBUG SOFT

How to avoid that mains spike shock horror

Just follow PETER VASEY's advice and use this routine to verify your SAVEs

IT must happen to everybody sooner or later – a previously healthy disc develops a fault, or there's a mains spike.

You save your latest masterpiece, yawn and pack up for the night. Next day, horror of horrors, the save was faulty. Despite recovering most of it, you can't for the life of you remember that brilliant piece of logic that was the foundation stone.

Well, it happened to me recently, but all was not lost because I'd made a backup.

Nevertheless, it was a salutory lesson and I quickly cobbled up a function key verifier for checking the SAVEs of Basic and assembler programs (Program I).

It doesn't check the SAVEs of pure machine code, but presumably the assembler generating the code will have already been saved. The routine was simple and effective, but oh so slow.

The next step was a machine code program using the same BGET technique, but this still only halved the time because of the multiple calls to the DFS.

A browse through back issues of *The Micro User* revealed that all my efforts so far had simply reinvented Mark Smiddy's neat verifier in the issue of March, 1984.

The problem was how to 'squirt' in the information quickly enough from the disc – the actual checking is virtually instantaneous in machine code. LOAD and *LOAD are very fast, but if the program being verified occupies more than half the available memory it can't be done.

The problem was how to 'squirt' in the information quickly enough...

Nevertheless, in Mode 7 with PAGE at &1900 there is enough room to store two programs 12,500 bytes long. Programs larger than this are relatively infrequent, at least until everybody has a B+, and a BGET type verifier can be used for very long programs.

So Program II tests whether there is room to store a copy above the original program, and if so *LOADS it and compares the copies directly, otherwise it performs a BGET type comparison.

The speed increase is stunning. Using the function key line it takes almost a minute to verify a 12k program, and 30 seconds using machine code BGET. It takes only three seconds using *LOAD, and most of that is loading time.

Incidentally, cassette users should stick to a byte by byte verifier such as Program I. The extra speed of machine code is insignificant compared with the cassette loading speed, and it would be galling to have *LOADed a long program only to find a fault right at the beginning.

The assembled code takes a little over one page of memory. I have assembled it at &900, and suggest you do the same to keep the checksum correct. Make sure you save the program before assembly, in case of errors.

Once the assembler has been checked you can, of course, reassemble into any area you choose. Save the assembled code using:

```
*SAVE V 900+142
```

To use it simply type CALL &900, or put it on a function key, or if the code is not already resident *RUN V will run it directly.

```
   10 *KEY0I.''"FILENAME? "A$:T%=OP.A
$:F.A%=PA. TOTOP-1:B%=BGET#T%:IFB%<>?
A%P."ERROR AT &";~A%:CLO.#0:EL.N.:P."
OK":CLO.#0¦M
```

Program I

The program is well annotated, the only obscure bit being the setting up in lines 500 to 820 of the *LOAD string to send to the command line interpreter via an OSCLI call (&FFF7).

First the memory to be used is filled with spaces, followed by "L.". Next the hex equivalent of TOP high byte + 1 and "00" are inserted leaving 10 spaces in between.

The filename found by the OSWORD call is placed in this gap, and the carriage return which ends the filename is changed into a space if there is room for the copy above the original.

The string starting at &605 then reads *L. FILENAME XX00,* which when sent to the command line interpreter will load the required program for comparison.

Owners of sideways RAM can make use of it to increase, to almost 16k in any screen mode, the size of file which can be verified directly. If the high byte of the program length, found by lines 370 to 400, is less than &40 (&4000=16k) the program is *LOADed into sideways RAM at &8000 and verified there.

There is the disadvantage, of course, that any software already resident in the RAM will be lost, but this can easily be

→

From Page 127

reloaded later when required. If you have multiple sideways RAM you can leave the top bank clear if you expect to use the verifier. The modifications to the utility for use with sideways RAM are as follows:

Delete lines 340-360, 400-430, 620-630.

Alter:

```
440 CMP#&40
450 BCCfits
600 LDA#ASC"8"
```

Add:

```
313 LDA#&80
317 STAcopy+1

645 STA&611

753 LDA&F4
757 PHA

823 LDA#15
827 STA&FE30

1113 PLA
1117 STA&FE30

1253 PLA
1257 STA&FE30
```

The new checksum value in line 2020 becomes 32374 and the new code is saved with:

```
*SAVE V 900+147
```

Note that line 823 sets the pointer for the sideways RAM block to 15. If your top bank of sideways RAM is wired up differently adjust this value accordingly.

This use of sideways RAM for data storage rather than software is not often exploited, but as you can see, is easy to implement and very fast in use, although it can only be accessed through machine code.

Blocks of data can be moved between sideways RAM and user RAM for processing using short machine code transfer routines within the main program.

This greatly increases the capacity and versatility of the BBC Micro, as was demonstrated by Tony Philip with his procedure overlay routine in *The Micro User* for July 1985.

Program II

```
   10 REM ********************
   20 REM Fast Verify
   30 REM By Peter Vasey
   40 REM ********************
   50 REM (C) The Micro User
   60 REM * Zero Page Usage *
   70 :
   80 oswrch=&FFEE
   90 osnewl=&FFE7
  100 osword=&FFF1
  110 oscli=&FFF7
  120 osfind=&FFCE
  130 osbget=&FFD7
  140 page=&18:         REM Zero Page
  150 top=&12:          REM storage
  160 himem=7:          REM addresses
  170 prog=&70
  180 copy=&72
  190 hex=&74
  200 flag=&76
  210 handle=&77
  220 :
  230 FORA%=0TO3STEP3
  240 P%=&900
  250 [OPTA%
  260 LDA#0
  270 STAprog
  280 STAcopy
  290 STAflag
  300 LDApage
  310 STAprog+1       \ set up address
es
  320 LDYtop+1        \ for comparison
  330 INY
  340 STYcopy+1       \ extract and st
ore
  350 TYA             \ hex address fo
r
  360 JSRhexy         \ *LOAD
  370 TYA
  380 CLC             \ test whether
  390 SBCpage         \ there is room
  400 STAhandle       \ to store a
  410 LDAhimem        \ copy of the
  420 CLC             \ program above
  430 SBCcopy+1       \ itself
  440 CMPhandle
  450 BCSfits         \ if no room
  460 DECflag         \ set flag
  470 .fits
  480 LDX#0           \ ask for filena
me
  490 JSRprint
  500 LDA#32
  510 LDX#12
  520 .clear          \ clear string
  530 STA&607,X       \ block and
  540 DEX
  550 BPLclear
  560 LDA#ASC("L")    \ insert groups
  570 STA&605         \ to give a
  580 LDA#ASC(".")    \ *LOAD at
  590 STA&606         \ copy address
  600 LDAhex          \ for later use
  610 STA&610         \ if room
  620 LDAhex+1
  630 STA&611
  640 LDA#ASC"0"
  650 STA&612
  660 STA&613
  670 LDA#13
  680 STA&614
  690 LDA#0
  700 LDX#params MOD256
  710 LDY#params DIV256
  720 JSRosword
  730 BCCgotname      \ use OSWORD to
  740 RTS             \ get filename
  750 .gotname
  760 BITflag         \ if there was
  770 BMIopenfile     \ room then
  780 LDA#32          \ replace carria
ge
  790 STA&607,Y       \ return with sp
ace
  800 LDX#5           \ and then send
  810 LDY#6           \ the *LOAD stri
ng
  820 JSRoscli        \ to Op. System
  830 LDY#0
  840 JMPmainloop
  850 .openfile       \ no room for co
py
  860 LDX#32          \ so print
  870 JSRprint        \ "WORKING" then
  880 JSRosnewl
  890 LDA#&40         \ open file for
  900 LDX#7           \ byte by byte
  910 LDY#6           \ comparison
  920 JSRosfind
  930 STAhandle
  940 .mainloop
  950 JSRgetbyte      \ compare byte
  960 CMP(prog),Y     \ with original.
  970 BNEerror        \ branch if erro
r
  980 CLC
  990 LDA#1
 1000 ADCprog         \ increment both
 1010 STAprog         \ address stores
 1020 STAcopy
 1030 BCCover
 1040 INCprog+1
 1050 INCcopy+1
 1060 .over
 1070 CMPtop            \ check for end
 1080 BNEmainloop       \ of program
 1090 LDAprog+1         \ at TOP
 1100 CMPtop+1
 1110 BNEmainloop       \ if TOP reached
 1120 LDX#11            \ print "VERIFIE
D"
 1130 JSRprint          \ and finish.
 1140 JMPclose
 1150 .getbyte          \ byte to compar
e
 1160 BITflag
 1170 BMIloadit         \ if room, get
 1180 LDA(copy),Y       \ byte from copy
 1190 RTS
 1200 .loadit           \ if no room
 1210 LDYhandle         \ get byte
 1220 JSRosbget         \ from file
 1230 LDY#0
 1240 RTS
 1250 .error            \ Error section.
 1260 LDX#20
 1270 JSRprint          \ error message
 1280 LDAprog+1         \ followed by
 1290 JSRhexy           \ error address
 1300 JSRoutput
 1310 LDAprog           \ (in program)
 1320 JSRhexy
 1330 JSRoutput         \ and finish.
 1340 .close
 1350 LDA#0
 1360 LDY#0
 1370 JSRosfind
 1380 JMPosnewl
 1390 .hexy             \ Hex converter.
 1400 PHA               \ save value,
 1410 LSRA              \ extract high
 1420 LSRA              \ nybble, and
 1430 LSRA              \ send to Hex
 1440 LSRA              \ store routine
 1450 LDX#0
 1460 JSRstorehex
 1470 PLA               \ restore value,
 1480 AND#&F            \ extract low
 1490 INX               \ nybble
 1500 .storehex
 1510 CMP#10
 1520 BCClessten        \ if nybble grea
ter
 1530 CLC               \ than 9, store
 1540 ADC#55            \ Hex character
 1550 STAhex,X
 1560 RTS
 1570 .lessten          \ if nybble less
 1580 ADC#48            \ than 10, store
 1590 STAhex,X          \ ASCII characte
r
 1600 RTS
 1610 .output
 1620 LDAhex
 1630 JSRoswrch
 1640 LDAhex+1
 1650 JMPoswrch
 1660 .print
 1670 LDAtext,X         \ Message print
 1680 CMP#13            \ routine
 1690 BEQend
 1700 JSRoswrch
 1710 INX
 1720 BNEprint
 1730 .end
 1740 RTS
 1750 .text
 1760 ]
 1770 :
 1780 REM SET UP STRINGS
 1790 :
 1800 $P%="FILENAME? "
 1810 $(P%+11)="VERIFIED"
 1820 $(P%+20)=CHR$7+"ERROR AT &"
 1830 $(P%+32)="WORKING"
 1840 P%=P%+40
 1850 params=P%
 1860 :
 1870 REM SET UP DSWORD PARAMETER BLO
CK
 1880 :
 1890 !P%=&607
 1900 P%?2=7
 1910 P%?3=33
 1920 P%?4=127
 1930 P%=P%+5
 1940 [OPTA%:]
 1950 NEXT
 1960 :
 1970 REM CHECKSUM
 1980 :
 1990 B%=0
 2000 FORA%=&900 TO P%-1
 2010 B%=B%+?A%:NEXT
 2020 IFB%<>31947VDU7:PRINT"WRONG CHE
CKSUM"
```

This listing is included in this month's cassette tape offer. See order form on Page 183.

PROBLEM

I HAVE made good use of the Disc scan program on page 103 of the October edition of The Micro User. My problem lies in the fact that I have the 62 file Watford DFS in my machine and the program will, of course, only read the first 31 files.

There must be a simple way of altering the parameter block to read the second catalogue on sector 3 of track 0, but I have not the experience to do it as yet.

Could you please supply me with details. I am sure that this could be the basis of an enhancement for this program and make is useable for all readers. – B. Watson, Bolsover.

SOLVED

The Watford system has the extra directory on sector 2 not 3, remember we start counting from zero.

Remove lines 280 and 290, then before line 640, say at 635, enter ?&78=0 for the normal set of files or ?&78=2 for the extra files given by the Watford system.

PROBLEM

I AM in the process of writing my first piece of ROM software. It is a protection ROM, its main function being to inactivate the computer until a suitable password is entered.

My problem is that after gaining access I would like the user to be able to turn off the ROM by issuing a star command so that it will not come back on, even after a Ctrl+Break. – R. Rostron, Manchester.

SOLVED

Ctrl+Break makes the computer look at all the sideways ROMs again so it is no use 'killing' the ROM's entry in the ROM table.

Why not have a flag (a memory bit pattern somewhere) that is tested when the ROM is entered, and if it is set the password sequence is ignored? Then the only way to reactivate it would be to turn the computer off.

This would work as the RAM powers up with either &FF or 00 so &A5 is a good pattern to choose as it would not appear randomly.

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OVER 60 COMMANDS

the SCYTHE

The Scythe toolkit contains a version of the VECTOR 1 tape to disc system, which will transfer most protected tapes, but we have not stopped there. The Scythe has been packed with a host of other commands: MDIS, SDIS, MEDIT, KLIST, BASE, ROMLIST, ROMSAVE, NROM, FLUSH, FORMAT, VERIFY, FREE, SFIND, BFIND XLIST, BAD, MRELOC, SLOW, TDISK, VECTOR, ROFF, RON, SECTLOAD, SECTSAVE, MSHIFT & MSWAP. These commands cover everthing from ROM management, utilities for the disc user, aid for the machine code or BASIC programmer, and a set of general utilities of use to all BBC users. The commands will accept input in HEX, DECIMAL, BINARY and the resident INTEGER variables making the Scythe very easy to use. The Scythe comes complete with a comprehensive manual and a free utilities disk.

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ROM Master is a budget utility ROM designed for people with several ROMs on their BBC computer. ROM master has several utilities to help prevent the interference which can occur between different ROMs, any ROMs that cause problems can be switched off even through <CTRL> <BREAK>. Using ROM master has been designed to be as easy as possible. Most commands will accept lists, so you can, for example, switch off several ROMs with just one command. ROMs can be specified by their socket numbers or their title or even abbreviations of the title. 20 commands are available, please send for full details.

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In Part 35 of his course MIKE COOK starts talking to himself. But fear not, it's all part of . . .

Processing sound in real time

WE considered last month how to construct a sound sampler. In this article and the next we will look at some of the ways that this can be used to process sound. So let your soldering irons cool off while we look at some of the untapped potential of last month's project.

The sound sampler consists basically of an analogue to digital converter (A/D) and a digital to analogue converter (D/A), both connected to the computer's 1MHz bus.

With the addition of a few filters to stop quantisation noise and aliassing we have the set-up shown in Figure I. Full details of the circuit were given last month and the order form is repeated this month on Page 157.

The simple software given last month sampled a sound and then allowed you to play it back. As you could do this at different speeds a modicum of sound processing could be done, but it was not in real time.

A real time system is one that responds to changing inputs while continuously outputting. So this month we will look at some of the real time processing that can be achieved with the sound sampler board. Two working programs will be described, as well as outlines for your own projects.

Perhaps the simplest form of processing you can perform on a digital input stream is to delay it. This is achieved simply by storing the digital values in memory and some time later retrieving and outputting them.

In effect that's what we did last month, but we did it in batches. For a continuous output we need to work on a conveyor belt.

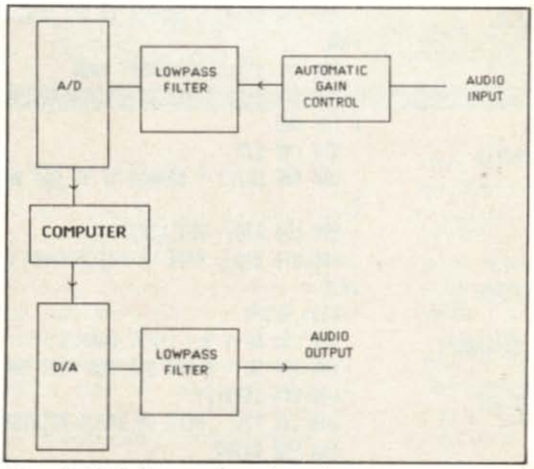


Figure I: Block diagram of sound sampler

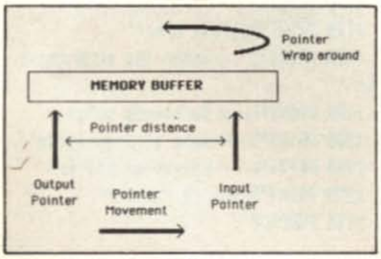


Figure II: A memory buffer

Consider Figure II, which shows an area of memory where we can store our data stream. We have an input pointer to indicate the place to store data and an output pointer to show from where we can extract it.

After a sound sample is deposited and recovered, both pointers are moved forward one place. Therefore, if the pointers are 100 locations apart, what comes out is what went in 100 samples ago. This is the basis of an echo chamber.

In order to save memory when a pointer reaches the end it is wrapped around to the beginning. This is what is called a circular buffer. The delay in this echo chamber is based upon the sample rate and the distance apart of the two pointers.

For a given size of memory buffer the furthest apart the two pointers can be is to point at the same location.

Yes, I know that sounds wrong, but if you think about it you will see why. If we extract and output data first, then store new data in the same place and then move the pointer on, that new data will only be output when we wrap around and use that location again.

So for the maximum use of memory we only need one pointer. We can vary the delay by altering the sample rate and the buffer length. By doing this we can produce the effect of a slight reverberation to a long delay echo.

The effect is quite entertaining. Alec,

From Page 131

my four-year-old son, finds it one of the most entertaining programs on any computer. He says a word and the computer says it back to him. The strange thing is that he always thinks it is a girl talking to him.

By setting the echo to a long time I have attempted to sing the duet "Me and my shadow" with myself. A strange phenomenon occurs when you set it to about a second's delay. If you try and read a few sentences you find that you are continually slowing down as if to try to catch up with yourself.

Eventually you come to a complete stop and have to set off again. It's a most disturbing experience, especially when you try it in company.

Going back to the concept of two pointers, suppose you moved one pointer up the memory and one pointer down.

There would be a variable delay as the two pointers moved further apart and then wrapped around and came

```
   10 PRINT"BEEB BODY BUILDING COURSE
"
   20 PRINT"ECHO CHAMBER"
   30 PRINT"By Mike Cook"
   40 PRINT
   50 MODE 1
   60 *KEY10 OLD|M RUN|M
   70 LINK=1
   80 BA=&FC00+LINK*32
   90 SC=BA+8
  100 FOR PASS=0 TO 2 STEP 2
  110 P%=&A00
  120 [
  130 OPT PASS
  140 .SETUP \ INITIALISE
  150 SEI \ DISABLE INTERRUPTS
  160 STA SC
  170 LDA #&40
  180 LDY #0
  190 LDX #&30
  200 STA &FE6B \ ENABLE TIMER 1
  210 LDA #&C0
  220 STA &FE6E \ ENABLE INTERRUPT
  230 LDA #0
  240 STA &FE65 \ START IT OFF
  250 RTS
  260 .ECHO
  270 JSR SETUP
  280 .LOOP
  290 LDA (&72),Y \ GET VALUE TO OUTP
UT
  300 STA BA \ OUTPUT IT
  310 .HOLD
  320 LDA &FE6D \ GET INTERRUPT FLAG
  330 BPL HOLD \ LOOP UNTIL TIME OUT
  340 STA &FE6D \ CLEAR INTERRUPT
  350 LDA BA \ GET SAMPLE
  360 STA SC \ START GETTING NEXT ONE
  370 STA (&72),Y
  380 INY \ MOVE POINTER ON
  390 BNE LOOP \ LOOP FOR ANOTHER
  400 INC &73 \ MOVE INPUT POINTER
  410 LDA &70 \ GET LIMIT
  420 CMP &73 \ HAS INPUT POINTER REA
CHED IT
  430 BNE LOOP \ BRANCH IF NOT
  440 STX &73 \ RESET IT
  450 JMP LOOP
  460 .BACK
  470 JSR SETUP
  480 .LOOPB
  490 LDA (&74),Y \ GET VALUE TO OUTP
UT
  500 STA BA \ OUTPUT IT
  510 DEC &74 \ REDUCE OUTPUT POINTER
  520 LDA #&FF
  530 CMP &74 \ TEST FOR WRAP AROUND
  540 BNE SKIP1 \ BRANCH IF NOT OVER
PAGE
  550 DEC &75 \ DECREMENT PAGE
  560 LDA #&30 \ SEE IF IT HAS REACHE
D THE END
  570 CMP &75
  580 BNE SKIP1 \ BRANCH IF IT HAS NO
T
  590 LDA &70 \ GET LIMIT
  600 STA &75 \ MAKE OUTPUT POINTER L
IMIT
  610 .SKIP1
  620 LDA BA \ GET INPUT SAMPLE
  630 STA SC \ START GETTING NEXT ONE
  640 STA (&72),Y
  650 INC &72 \ MOVE ON INPUT POINTER
  660 BNE SKIP2
  670 INC &73 \ MOVE ON PAGE
  680 LDA &70 \ GET LIMIT
  690 CMP &73 \ HAS INPUT POINTER REA
CHED IT
  700 BNE SKIP2 \ BRANCH IF NOT
  710 LDA #&30 \ PUT POINTER BACK TO
START
  720 STA &73
  730 .SKIP2
  740 LDA &FE6D \ GET INTERRUPT FLAG
  750 BPL SKIP2 \ LOOP UNTIL TIME OUT
  760 STA &FE6D \ CLEAR INTERRUPT
  770 JMP LOOPB
  780 ]
  790 NEXT
  800 CLS
  810 PROC_INSTRUCTIONS
  820 CD%=25
  830 ?&FCC7=0
  840 ?&FCC6=D%
  850 ?&72=&00:?&74=&00
  860 ?&73=&30:?&75=&30
  870 REPEAT
  880 PROC_UPDATE
  890 A$=GET$
  900 IF A$="B" THEN ?&70=F%+&30:CALL
 BACK
  910 IF A$="E" THEN ?&70=F%+&30:CALL
 ECHO
  920 IF A$="R" THEN INPUT"Sample Rat
e ",R%:?&FE66=R%
  930 IF A$="L" THEN PROC_BLEN
  940 UNTIL FALSE
  950 DEF PROC_BLEN
  960 REPEAT
  970 INPUT"Buffer length in pages (1
 to 80) ",L%
  980 UNTIL L%>0 AND L%<81
  990 IF L%=80 THEN L%=0
 1000 ENDPROC
 1010 DEF PROC_UPDATE
 1020 PRINT TAB(0,14)
 1030 PRINT "Sample rate delay :- ";R
%
 1040 PRINT
 1050  IF L%=0 THEN F%=80 ELSE F%=L%
 1060 PRINT "Buffer length ";F%/4;"K
bytes"
 1070 PRINT TAB(0,20);SPC(40)
 1080 PRINT TAB(0,19)
 1090 ENDPROC
 1100 DEF PROC_INSTRUCTIONS
 1110 PRINT
 1120 PRINT"BEEB BODY BUILDING COURSE
"
 1130 PRINT"ECHO CHAMBER"
 1140 PRINT"February 1986"
 1150 PRINT"By Mike Cook"
 1160 PRINT
 1170 PRINT"Options are:-"
 1180 PRINT"E  - Enter the echo chamb
er"
 1190 PRINT"B  - Backwards echo"
 1200 PRINT"R  - Rate of digitising"
 1210 PRINT"L  - Length of buffer"
 1220 PRINT"Break to return"
 1230 ENDPROC
```

Program I

closer together. What is more, the output would be the reverse of the input. You could teach yourself to talk backwards. This is as difficult as it sounds. Because of the variable length delay you do not always get a whole word backwards but first of all part of a word and some time later the rest.

My party trick is to say HELLO and the computer responds with the reverse of hello which is WARLA. This is not believed by onlookers until I say WARLA and the computer responds with HELLO. Remember, it is the whole sound that is backwards, not the letter sounds in reverse order.

Program I implements these two ideas in sound processing. As all processing must be done with the interrupts off to reset any parameter you must press the Break key. This is programmed in line 60 to re-run the program.

You can set up the buffer length in increments of a quarter k up to 20k long. Using increments of this size makes the programming easy, as the buffer is always a whole number of pages.

The sample rate can also be set. This is the number of micro seconds between each sample. This value is loaded into Timer 1 of the VIA and controls the sampling rate.

As it takes some time for the program to do the storage and transfer, values below about 25 have no effect on the sampling rate because it's going flat out already. Remember, the quicker sampling rates give the better quality but the shortest delay.

As the sample rate and buffer length are held in resident integer variables these are retained when the program is re-run. This means you only have to change the one you want before entering the echo chamber or the backwards echo chamber.

Well that's what it does, so let's see how it does it. Lines 70 to 90 calculate the address of the converters based upon where you have the address select link on your sound sampler board.

The program is written for position 1. If yours is different you must change line 70.

Next comes the machine code section that does all the work. Lines 140 to 250 set up the VIA timer and close down the system interrupts. Memory locations &72 and &73 are used to hold the pointer's page value, with the Y register holding the position in the page to access.

Lines 290 and 300 fetch the data at the pointer and output it to the D/A converter.

Lines 310 to 340 just hang about until the VIA timer times out. Then lines 350 to 370 read the new data, start the conversion process for the next byte of data and store the new data at the pointer.

Next we have to move the pointer. This is done by incrementing the Y register. If this does not wrap round we can go and output another sample, line 390. If the register reaches zero we need to increment the page number of the pointer, and if this has reached the limit of the buffer, a value stored in memory location &70, we need to reset the pointer back to the beginning – a value of &30.

As these buffer locations cover the same area as a mode 1 screen we can see the data being written on the screen.

The next section of code implements the backward echo. In this we have two pointers, one for input and the other for output. This time as the pointers are moving in different directions the memory locations hold the whole of the pointer and the Y register is set at zero.

Because of the instruction set's addressing modes we always need to specify an index register when we are using pointers. Lines 490 to 610 get the data from the buffer, output it and move the output pointer.

The pointer is stored in two bytes. Most of the time the least significant byte needs to be decremented, but when this goes from zero to &FF the most significant byte also needs to be decremented and tested to see if that needs wrapping around to the end of the buffer.

Next lines 620 to 720 do the same thing on the input side. Remember that this time the input pointer is incremented. Finally lines 730 to 770 hang about until Timer 1 times out.

The rest of the program is in Basic and is simply the house keeping setting up pointer values and allowing you to change sample rate and buffer length. It also keeps the screen looking nice and tidy as well as printing out my name.

Egotistical lot, us programmers – do we really think anyone types the lines with our names on, let alone reads them when they are on the screen?

When you are running the backwards echo you will hear a click when the pointers cross as the data changes suddenly from that input a long time ago to that only just input.

As you shorten the length of the buffer you will shorten the maximum delay until you reach a point where it does not sound backwards at all.

The click will sound like a continuous buzz, and your voice will be recognisable. This is because you are playing

→

PROBLEM

I AM the owner of an Ultra Drive system and recently purchased an M4853 disc drive and an Acorn DFS. My problem is that they both require the use of the auxilliary port. Might it be possible to wire both units into one socket then switch between *DISC and the control *ULTRAU?

Or at worse is it possible to keep pulling the plug to power each unit as required with no adverse effect? Another query I have is that PAGE on the Ultra Drive is at E00 but on the DFS it's at 1900. Will switching between systems change PAGE or am I stuck with 1900?

I realise that a disc drive upgrades a computer but all my programs and data are on the Ultra Drive tapes and I would like to use both. – T. Hatton.

SOLVED

I don't think the disc drive uses the port, but the auxiliary power supply. I always recommend that you use a separate power supply for discs as the computer's supply is hardly sufficient. Therefore it follows that I would not recommend using the same supply for both devices.

However you can plug in each device without any adverse affect. As to PAGE, if you don't want to use discs then type in PAGE = &E00. Switching between systems will not automatically reset PAGE.

From Page 133

backwards a single cycle of audio and it does not matter which way a single cycle is played.

This brings me to the next form of sound processing. Suppose we had a very short buffer that only covered a single cycle of the sound. If we had two pointers, as in Figure II, what would happen if we moved them in the same direction but at different rates?

Let's say we moved the output pointer twice as fast as the input pointer. First there would be a variable delay, but as we are dealing with a very short buffer we would not notice that.

Secondly, as the input pointer moved once around the buffer laying down one cycle of the input we would output that cycle twice.

The result is that what comes out is twice the frequency that went in. What is more, as we are only dealing with a single cycle, there is no speeding up of the sound, only a shift in frequency.

By altering the relative rates of the input and output pointers we can achieve any degree of frequency shift we like.

You could have a shift up or down in intervals of a third or fifth and sing chords with yourself. I used it to see what Alec will sound like when his voice breaks.

This could be useful to those of you who are deep sea divers and have to breath helium atmosphere. This shifts the pitch of sounds and by using the program you can adjust them back to allow you to communicate with the surface.

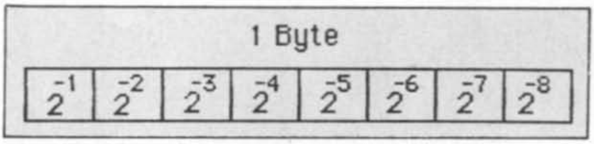


Figure III: A binary fraction

When the pointers are moving at vastly different speeds you can achieve what can only be described as special effects which tend to sound like computers in television plays.

In order to move the pointers at different rates we need to increment one and add a fractional value to the other. When the fractional parts pass one the pointer moves on.

As we only need a short buffer the pointer can fit into one byte with the fractional part of the pointer in another. Instead of incrementing the least significant byte of the pointer we add the fractional increment to the least significant byte.

The fraction will be a binary fraction, as shown in Figure III. Therefore the fraction *one half* will translate to a binary fraction of &80. Note that some fractions cannot be expressed exactly as binary fractions, just as *one third* cannot be expressed as a decimal fraction.

The frequency shifter is shown in Program II. It starts off very much like the Echo program, with line 70 recording the link position and lines 140 to 260 setting up the VIA timers. I'll let you into a secret, I didn't type it in again but used the first program.

However from line 290 it starts getting different. The input and output pointers are still in the same place from the Echo program, but this time the incremental fractions to add to the pointers are in memory locations &70 and &71.

As the buffer is restricted to one page the pointer is placed into the Y register and the address to store the data is calculated by adding this value to constant given by the variable *BUF*. This is set up in line 120 to be in the lower portion of the screen.

Before the pointer is moved the carry flag is set so that a fractional increment of 255 will result in a real increment of one. Also a value of zero as an increment will still move the pointer.

When setting the fractional rate – lines 730 to 860 – the fraction you type in is converted to a binary fraction and then converted back to decimal before being displayed.

This means that the number displayed as the increment rate is not always what you put in. When setting one pointer's fractional rate the other is reset to one. This ensures that every sample period at least one pointer moves.

Well, that completes the predigested work, but as always the real fun in a Body Building project comes when you start to write your own programs, so let's look at some outlines of what you might do.

If you cast your mind back to the echo program, how about outputting not only what you have stored but adding a little bit of what is coming in?

You can use the rotate or shift instructions to reduce the values and then add them up. What you will get is a real time pre-echo. You will hear a little of the sound first, followed by a loud delayed sound.

I programmed this on another system and found it was a simulation of the

PROBLEM

I BOUGHT my BBC B early last year and it has been in constant use ever since. Lately, however, it has become erratic in its response to the keyboard. Suddenly nothing will appear on the screen.

When this happens I keep patiently tapping away at the keys at random and soon it starts working normally again. I have a nasty feeling that one day soon it will pack up altogether.

I would be grateful for any advice that would point out where the fault may lie and hints for a possible cure. I have given it a good clean up inside and out and that improved it for a time, but I would like a more permanent result. – J. Fowler, Benfleet.

SOLVED

The problem is almost certainly one of a cracked track on the keyboard PCB. This happens next to the soldered joint of the key, and can be found by careful use of a continuity meter or battery and bulb.

If you can identify the keys that are erratic it might help you home in on the faulty track. The only reason for this fault is a loose or bad connector between the keyboard and computer. Try waggling it about to ensure it is properly seated.

```
   10 PRINT"BEEB BODY BUILDING COURSE
"
   20 PRINT"FREQUENCY SHIFTER"
   30 PRINT"By Mike Cook"
   40 PRINT
   50 MODE 1
   60 *KEY10 OLD|M RUN|M
   70 LINK=1
   80 BA=&FC00+LINK*32
   90 SC=BA+8
  100 FOR PASS=0 TO 2 STEP 2
  110 P%=&A00
  120 BUF=&6C00
  130 [
  140 OPT PASS
  150 .SETUP \ INITIALISE
  160 SEI \ DISABLE INTERRUPTS
  170 STA SC
  180 LDA #&40
  190 LDY #0
  200 LDX #&30
  210 STA &FE6B \ ENABLE TIMER 1
  220 LDA #&C0
  230 STA &FE6E \ ENABLE INTERRUPT
  240 LDA #0
  250 STA &FE65 \ START IT OFF
  260 RTS
  270 .SHIFT
  280 JSR SETUP
  290 .LOOP
  300 LDY &75 \ GET OUTPUT POINTER
  310 LDA BUF,Y \ GET VALUE
  320 STA BA \ OUTPUT IT
  330 SEC \ SET CARRY
  340 LDA &71 \ GET OUTPUT RATE
  350 ADC &74 \ ADD FRACTIONAL PART
  360 STA &74
  370 LDA #0
  380 ADC &75 \ ADD INTEGER PART
  390 STA &75
  400 .HOLD
  410 LDA &FE6D \ GET INTERRUPT FLAG
  420 BPL HOLD \ LOOP UNTIL TIME OUT
  430 STA &FE6D \ CLEAR INTERRUPT
  440 LDA BA \ GET SAMPLE
  450 STA SC \ START GETTING NEXT ONE
  460 LDY &73 \ INPUT POINTER
  470 STA BUF,Y \ STORE IT
  480 SEC \ SET CARRY
  490 LDA &70 \ GET INPUT RATE
  500 ADC &72 \ ADD FRACTIONAL PART
  510 STA &72
  520 LDA #0
  530 ADC &73 \ ADD INTEGER PART
  540 STA &73
  550 JMP LOOP
  560 ]
  570 NEXT
  580 CLS
  590 PROC_INSTRUCTIONS
  600 CD%=25
  610 ?&FCC7=0
  620 ?&FCC6=D%
  630 ?&72=&00:?&74=&00
  640 ?&73=&00:?&75=&00
  650 REPEAT
  660 PROC_UPDATE
  670 A$=GET$
  680 IF A$="S" THEN ?&70=I%:?&71=O%:
CALL SHIFT
  690 IF A$="R" THEN INPUT"Sample Rat
e ",R%:?&FE66=R%
  700 IF A$="I" THEN PROC_IN_RATE
  710 IF A$="O" THEN PROC_OUT_RATE
  720 UNTIL FALSE
  730 DEF PROC_IN_RATE
  740 REPEAT
  750 INPUT"Increment fraction for in
put",I
  760 I%=(I*256)-1
  770 O%=255
  780 UNTIL I%<256
  790 ENDPROC
  800 DEF PROC_OUT_RATE
  810 REPEAT
  820 INPUT"Increment fraction for ou
tput",O
  830 O%=(O*256)-1
  840 I%=255
  850 UNTIL O%<256
  860 ENDPROC
  870 DEF PROC_UPDATE
  880 PRINT TAB(0,14)
  890 PRINT "Sample rate delay :- ";R
%;SPC(5)
  900 PRINT
  910 PRINT "Input  increment ";((I%+
1)/256);SPC(39-POS)
  920 PRINT "Output increment ";((O%+
1)/256);SPC(39-POS)
  930 PRINT TAB(0,20);SPC(40)
  940 PRINT TAB(0,21);SPC(40)
  950 PRINT TAB(0,19)
  960 ENDPROC
  970 DEF PROC_INSTRUCTIONS
  980 PRINT
  990 PRINT"BEEB BODY BUILDING COURSE
"
 1000 PRINT"FREQUENCY SHIFTER"
 1010 PRINT"February 1986"
 1020 PRINT"By Mike Cook"
 1030 PRINT
 1040 PRINT"Options are:-"
 1050 PRINT"S  - Shift frequency"
 1060 PRINT"R  - Rate of digitising"
 1070 PRINT"I  - Input rate"
 1080 PRINT"O  - Output rate"
 1090 PRINT"Break to return"
 1100 ENDPROC
```

Program II

system they have on British Rail stations.

You know – the speaker on your platform is not working properly and the one at the end of the station is. The result is that you can't understand anything despite it being loud.

The only snag is that I don't know how they make it sound like that for everyone on the station. It must be a really complex system.

Extending that idea, you could have several output pointers, all moving at the same rate making a differently weighted contribution to the final sound. I haven't a clue what that would sound like.

Another use for the sound sampler is to experiment with digital filters. This is where the output consists of a weighted sum of the previous N inputs.

The weighting of samples allows you to simulate any filter shape you like. You can calculate these weightings from the shape of the filter.

This is far too involved to explain in a single article, but for those interested in pursuing this there is an excellent book called Introduction to Digital Filters by T.J. Terrell published by MacMillan 1980.

Study of this subject would make an ideal computer project for those taking examinations, as it can be taken at many levels from the intuitive to the mathematically weighty.

Well having scratched the surface of real time processing, next month we will look at how we can take a sound sample, bash it about a bit and play it back as a tune. So until then happy real time.

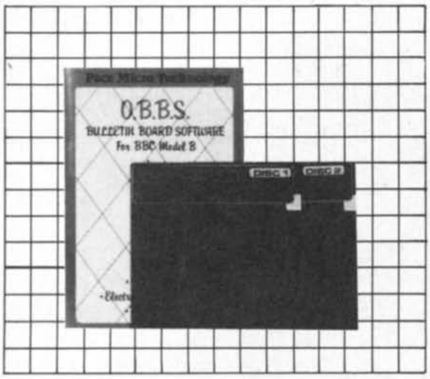
New from Pace

Nightingale Accessory Board

NIGHTINGALE
ACCESSORY BOARD
PACE
Micro Technology

This new accessory for Nightingale offers three new facilities on a single card. The auto-dialler now means that you can dial any number without using the telephone. Software designed for use with Commstar will dial a specified number or sequence of numbers once or more until a connection is established, each call being optionally monitored through a loud speaker. Any number of directories can be created and for each telephone number in a directory you may specify a series of attributes which allow Commstar to configure itself automatically for that particular system. Nothing could be easier. Any baud rate may be configured under software control including two new operating speeds 1200 and 600 half duplex which were not previously available. Finally, if you hope to set up your own database or bulletin board, the accessory board includes auto-answering. Nightingale and accessory board, a complete solution.

Accessory Board £49 plus VAT
Dialing Software £10 plus VAT



OBBS Colour Bulletin Board Software

Transform your BBC Micro into a unique bulletin board, be your own sysop. If you already own a Nightingale modem fitted with the accessory board or indeed if you intend buying this combination, with OBBS coloured Bulletin Board Software, you can run your own bulletin board. The entry level system includes many features normally only found on systems costing ten times as much. Full message searching and XMODEM uploading and downloading of software are provided along with unique colour teletext graphics and text facility.

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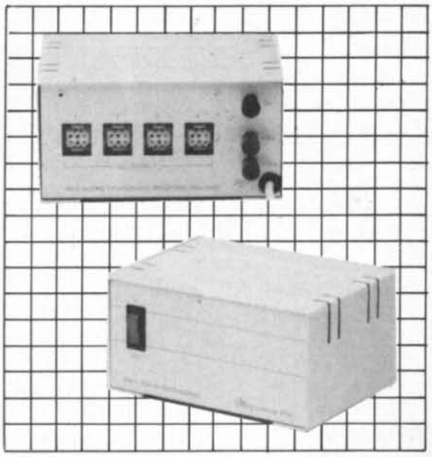
Independent Power Supply



We have designed this Independent Power Supply for those of you who use disc drives powered from the BBC power supply and are concerned that with the addition of Sideways ROM boards etc., the psu is being overloaded. The Pace independent power supply unit plugs directly into the mains and has four power output sockets of the type used on the BBC. This means that you can plug your unpowered disc drives, buggies etc., directly into this unit thus removing the strain from the BBC power Supply.

Technically speaking, the Pace Independent PSU takes 240V AC mains and gives out regulated +5V & +12V DC (±2%) and OV power through 4 parallel sockets. These sockets are of the same type as provided at the Auxilliary power output socket of the BBC microcomputer. Push connectors are also provided for all three voltage levels.

The unit is capable of supplying two single disc drives or one dual disc drive plus one or two other devices, such as Eprom programmers, which draw less current. The maximum current available is approximately **1.5A @ +5V** and **1.2A @ +12V.**

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```
  460 STY blockadd+1
  470 TAY
  480 BNE load
  490 \Save file. First set pointers
in
  500 \control block and page zero
  510 \pointers
  520 LDY #&F
  530 LDA (blockadd),Y \End address
  540 STA lower+1
  550 CLC
  560 ADC #discpage-tapepage
  570 STA (blockadd),Y
  580 STA upper+1
  590 SEC
  600 SBC #discpage
  610 STA length     \Length in pages
  620 TAX            \Tempy. storage
  630 LDY #&B
  640 LDA #discpage
  650 STA (blockadd),Y \Start address
  660 LDY #0
  670 STY lower
  680 STY upper
  690 \Now up-load program
  700 .uploop
  710 LDA (lower),Y
  720 STA (upper),Y
  730 DEY
  740 BNE uploop
  750 DEC lower+1
  760 DEC upper+1
  770 DEX            \Page counter
  780 BPL uploop
  790 JSR main       \Save to disc
  800 JSR download   \Down-load again
  810 BMI reset      \Always jumps
  820 .load
  830 LDY #3         \Reset pointer
  840 LDA #discpage
  850 STA (blockadd),Y
  860 JSR main       \Load from disc
  870 LDY #&B        \Down-load progr
am
  880 LDA (blockadd),Y
  890 STA length
  900 JSR download
  910 .reset         \Exit as on entr
y
  920 LDX blockadd
  930 LDY blockadd+1
  940 LDA ctrl
  950 RTS
  960 .main
  970 \Switches to disc, loads or sav
es
  980 \then switches back to tape.
  990 \Set vector to trap DFS errors
 1000 LDA #error MOD 256
 1010 STA brkV
 1020 LDA #error DIV 256
 1030 STA brkV+1
 1040 \Clear DFS RAM area
 1050 LDA #tapepage
 1060 STA lower+1
 1070 LDA #0
 1080 STA lower
 1090 TAY
 1100 LDX #discpage-tapepage
 1110 .clearloop
 1120 STA (lower),Y
 1130 INY
 1140 BNE clearloop
 1150 INC lower+1
 1160 DEX            \Page counter
 1170 BNE clearloop
 1180 \Switch on disc
 1190 LDX #disctext MOD 256
 1200 LDY #disctext DIV 256
 1210 JSR oscli
 1220 \Original register values
 1230 JSR reset
 1240 \ROM routine to load or save
 1250 JSR !fileV
 1260 STA ctrl       \File type
 1270 \*TAPE and reset vectors
 1280 JSR discoff
 1290 RTS
 1300 .download
 1310 LDY #0
 1320 STY upper
 1330 STY lower
 1340 LDA #discpage
 1350 STA upper+1
 1360 LDA #tapepage
 1370 STA lower+1
 1380 .downloop
 1390 LDA (upper),Y
 1400 STA (lower),Y
 1410 INY
 1420 BNE downloop
 1430 INC upper+1
 1440 INC lower+1
 1450 DEC length
 1460 BPL downloop
 1470 RTS
 1480 \To download on disc 'SAVE'
 1490 \errors
 1500 .error
 1510 LDA ctrl
 1520 BNE dontdown
 1530 JSR download
 1540 .dontdown
 1550 JSR discoff    \Reset
 1560 JMP !brkV      \Old vector valu
e
 1570 ]
 1580 disctext=P%:$P%="DISC"
 1590 P%=P%+5
 1600 NEXT
 1610 PRINT "*SAVE parameters:"'~locn
,~P%
```

PROBLEM

You may have answered this or a similar problem before, but nevertheless I am at a loss to know how to deal with it. Briefly, I have an issue 4 board, upgraded to 1.2 OS, with Wordwise the only extra ROM fitted.

When I fit the Opus DDOS, 20 minutes or so after power up random flashing minus signs begin to appear, and the screen characters start to break up. This is only apparent in Mode 7. When I remove the controller board the problem disappears.

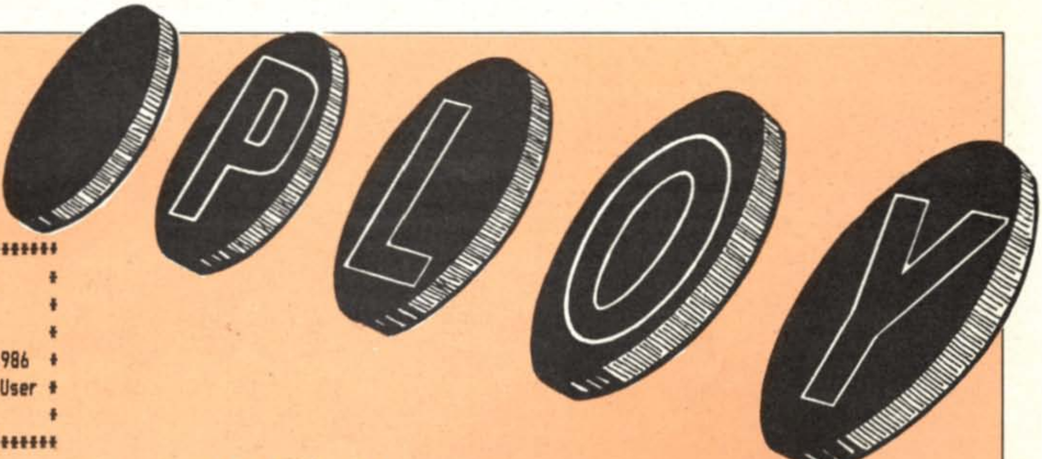
Presumably something is overheating but what and where? I've tried the rule of thumb guide, but all the components are at little more than room temperature.

SOLVED

This is a matter of bus loading. The disc controller board is upsetting the impedance of the buses and causing a malfunction. There is no copper-bottom cure for this.

I have heard that replacing IC14, a 74LS245, with a 75ALS245, might work as this will work faster and reduce capacitive bus loadings. If not then your computer will not work with any extra bus loading like zif sockets, extension ROM cards and so on.

If YOU have a technical problem you can't solve write to: Mike Cook, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.



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```
  100 REM ******************
  110 REM *                *
  120 REM *      PLOY      *
  130 REM *                *
  140 REM *  R.Nixon 1986  *
  150 REM * (c) Micro User *
  160 REM *                *
  170 REM ******************
  180 REM
  190 *FX229,1
  200 *KEY100.|MRUN|M
  210 CW%=0:HW%=0
  220 MODE7:VDU23;8202;0;0;0;:PNT%=0:
XX%=0:J1%=0:K1%=0:CP%=0:HL%=0:VL%=0:S
D%=1:DIMA%(8,8),B%(8,2),C%(8,2)
  230 PROCread_data:PROCbackground:PR
OCbanner:FORZZ%=1TO220STEP17:SOUND1,-
15,ZZ%,1:SOUND1,-15,ZZ%+39,1:NEXT
  240 PROCinit_title:FORJJ%=1TO5:READ
JJ1%,COL%:PROCtext(COL%):FORZZ1%=1TOJ
J1%:READA$:PRINTA$:NEXT
  250 VDU26:PROCtitle:NEXT:VDU28,8,22
,30,7:CLS:VDU26:PROCboard:ON RND(2) G
OTO260,310
  260 PROCploy:VDU31,5,2,130,157,132,
141:PRINTSPC5"Your move...";SPC5;:VDU
31,5,3,130,157,132,141
  270 PRINTSPC5"Your move...";SPC5;:P
ROCselect_row:PROCleft_or_right
  280 MV%=MV%+1
  290 VDU31,6+XX%*3,5,32
  300 PROCcheck_play:IFCW%=1 OR HW%=1
 PROCgame_over
  310 PROCploy:PROCcomputer_play
  320 VDU31,6+X%*3,5:IFD%=1 VDU68 ELS
E VDU85
  330 XX%=X%
  340 *FX15,1
  350 MV%=MV%+1
  360 PROCcheck_play:IFCW%=1 OR HW%=1
 PROCgame_over
  370 GOTO260

  380 DEFPROCploy:VDU31,5,2,130,157,1
32,141,135:PRINTSPC4STRING$(3,CHR$91)
CHR$132"PLOY"CHR$135STRING$(3,CHR$93)
SPC6;
  390 VDU31,5,3,130,157,132,141,135:P
RINTSPC4STRING$(3,CHR$91)CHR$132"PLOY
"CHR$135STRING$(3,CHR$93)SPC6;:FORV%=
1TO10000:NEXT:ENDPROC

  400 DEFPROCbackground:FORJ%=0TO24:I
FJ%=6 VDU31,7,6,135
  410 VDU31,0,J%,129,157,31,39,J%,156
:IFJ%>6 AND J%<24 VDU31,3,J%,91,91,91
,132,157,31,32,J%,129,157,129,93,93,9
3:NEXT:ENDPROC
  420 NEXT:ENDPROC

  430 DEFPROCtext(TC%):FORZZ%=6TO18:C
L%=TC%:IFJJ%=5 AND ZZ%=12 CL%=130 ELS
E IFJJ%=5 AND ZZ%=14 CL%=129
  440 VDU31,8,ZZ%,CL%:NEXT:VDU28,9,19
,30,7:CLS:ENDPROC

  450 DEFPROCbanner:FORJ%=0TO5
  460 VDU31,0,J%,129,157,31,39,J%,156
:IFJ%>0 AND J%<5 VDU31,3,J%,133,157,3
1,35,J%,129,157:IFJ%>1 AND J%<4 VDU31
,5,J%,130,157,132,141,135:PRINTSPC4ST
RING$(3,CHR$91)CHR$132"PLOY"CHR$135ST
RING$(3,CHR$93)SPC6;:VDU31,33,J%,133,
157
  470 NEXT:ENDPROC
  480 PROCcheck_directions:F%(X1%)=AM
%:X%=X%+1:IFX%=9 X%=1

  490 DEFPROCread_data
  500 FORJ%=1TO8:FORK%=1TO8:READA%(K%
,J%):NEXTK%,J%:ENDPROC
  510 DATA 7,1,7,0,1,7,0,7
  520 DATA 1,7,1,0,1,0,7,0
  530 DATA 7,1,0,0,1,1,0,7
  540 DATA 0,0,0,7,7,1,1,1
  550 DATA 1,1,1,7,7,0,0,0
  560 DATA 7,0,1,1,0,0,1,7
  570 DATA 0,7,0,1,0,1,7,1
  580 DATA 7,0,7,1,0,7,1,7

  590 DEFPROCboard
  600 FORJ%=1TO8:FORK%=1TO8
  610 VDU31,J%*3+5,K%*2+5,145+A%(J%,K
%),255,ABS(1-A%(J%,K%))+145,31,J%*3+6
,K%*2+6,255,132
  620 NEXTK%,J%:ENDPROC

  630 DEFPROCselect_row:SOUND1,-15,15
0,1
  640 Y%=0:REPEATVDU31,7,Y%*2+7,156
  650 PROCadval:VDU31,7,Y%*2+7,157
  660 Y%=Y%+1:IFY%=8 Y%=0
  670 UNTILAD%=2:REPEATUNTIL(ADVAL(0)
AND3)=0 AND INKEY(-99)=0 AND INKEY(-7
4)=0:ENDPROC

  680 DEFPROCleft_or_right:SOUND1,-15
,150,1
  690 Z%=0:REPEATZ%=Z%+1:IFZ%=3 Z%=1
  700 IFY%=0 Y%=8
  710 ON Z% GOTO720,730
  720 VDU31,1,Y%*2+5,156,135:GOTO740
  730 VDU31,33,Y%*2+5,156,135:GOTO740

  740 PROCadval:VDU31,1,Y%*2+5,157,12
9,31,33,Y%*2+5,157,129:UNTILAD%=2
  750 IFZ%=1 PROCmove_left ELSE PROCm
ove_right
  760 REPEATUNTIL(ADVAL(0)AND3)=0 AND
 INKEY(-99)=0 AND INKEY(-74)=0:ENDPRO
C

  770 DEFPROCadval:QT%=0
  780 IFINKEY(-82)=-1 PROCsound
  790 AD%=ADVAL(0)AND3:SP%=INKEY(-99)
:RT%=INKEY(-74):IFAD%=0 AND SP%=0 AND
 RT%=0 PNT%=0:GOTO780
  800 IFPNT%=0 PNT%=1:GOTO840
  810 QT%=0:Z1%=0:REPEATZ1%=Z1%+1:IF(
ADVAL(0)AND3)=0 AND INKEY(-99)=0 AND
INKEY(-74)=0 PNT%=0:Z1%=200:QT%=1
  820 UNTILZ1%=200
  830 IFQT%=1 GOTO790
  840 IFSP% AD%=1 ELSE IFRT% AD%=2
  850 IFAD%=1 SOUND1,-15,150,1 ELSE S
```

→

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```
DUND1,-15,60,1
  860 ENDPROC

  870 DEFPROCmove_left:SOUND1,-15,30,
2
  880 P%=&7C08+40*(Y%*2+6):FORK%=1TO3
:Q%=?P%:FORJ%=P%TOP%+23:?J%=?(J%+1):N
EXT:?(P%+23)=Q%:NEXT
  890 Q%=A%(1,Y%):FORJ%=1TO7:A%(J%,Y%
)=A%(J%+1,Y%):NEXT:A%(8,Y%)=Q%:ENDPRO
C

  900 DEFPROCmove_right:SOUND1,-15,30
,2
  910 P%=&7C08+40*(Y%*2+6):FORK%=1TO3
:Q%=?(P%+23):FORJ%=P%+23TOP%STEP-1:?J
%=?(J%-1):NEXT:?P%=Q%:NEXT
  920 Q%=A%(8,Y%):FORJ%=8TO2STEP-1:A%
(J%,Y%)=A%(J%-1,Y%):NEXT:A%(1,Y%)=Q%:
ENDPROC

  930 DEFPROCmove_down:IFCP%GOTO950 E
LSE SOUND1,-15,30,2
  940 P%=&7D1D+X%*3:FORK%=1TO2:FORKK%
=1TO200:NEXT:Q%=?(P%+600):FORJ%=P%+56
0TOP%STEP-40:?(J%+40)=?J%:NEXT:?P%=Q%
:NEXT
  950 Q%=A%(X%,8):FORJ%=8TO2STEP-1:A%
(X%,J%)=A%(X%,J%-1):NEXT:A%(X%,1)=Q%:
ENDPROC

  960 DEFPROCmove_up:IFCP% GOTO980 EL
SE SOUND1,-15,30,2
  970 P%=&7D45+X%*3:FORK%=1TO2:FORKK%
=1TO200:NEXT:Q%=?P%:FORJ%=P%TOP%+560S
TEP40:?J%=?(J%+40):NEXT:?(P%+600)=Q%:
NEXT
  980 Q%=A%(X%,1):FORJ%=1TO7:A%(X%,J%
)=A%(X%,J%+1):NEXT:A%(X%,8)=Q%:ENDPRO
C

  990 DEFPROCtime_init:VDU31,9,2,130,
157,132,141:PRINT"My move...";SPC7:VD
U31,9,3,130,157,132,141:PRINT"My move
...";SPC7:ENDPROC

 1000 DEFPROCtime:IFCP%=0 ENDPROC ELS
E TME%=(TIME DIV 100)MOD60:VDU31,23,2
,133,141:PRINT;TME%;:VDU31,23,3,133,1
41:PRINT;TME%;:ENDPROC

 1010 DEFPROCcomputer_play:CP%=1:PROC
time_init:TIME=0
 1020 LOCALA%,B%,C%
 1030 FORA%=1TO2
 1040 FORB%=1TO8
 1050 ON A% GOTO1060,1070
 1060 X%=B%:PROCmove_down:GOTO1080
 1070 X%=B%:PROCmove_up
 1080 PROCcheck_play
 1090 C%(B%,A%)=SP%
 1100 ON A% GOTO1110,1120
 1110 X%=B%:PROCmove_up:GOTO1130
 1120 X%=B%:PROCmove_down
 1130 NEXT
 1140 NEXT
 1150 BM%=-9999
 1160 FORA%=1TO2
 1170 FORB%=1TO8
 1180 IFC%(B%,A%)>BM% BM%=C%(B%,A%)
 1190 NEXT
 1200 NEXT
 1210 ABC%=0:FORA%=1TO2
 1220 FORB%=1TO8
 1230 IFC%(B%,A%)=BM% ABC%=ABC%+1:B%(
ABC%,1)=B%:B%(ABC%,2)=A%
 1240 NEXT
 1250 NEXT
 1260 Y%=RND(ABC%):IFY%=0 Y%=1
 1270 X%=B%(Y%,1):C%=B%(Y%,2):D%=C%:C
P%=0:ON C% GOTO1280,1290
 1280 PROCmove_down:ENDPROC
 1290 PROCmove_up:ENDPROC
 1300 ENDPROC

 1310 DEFPROCcheck_play:SP%=0
 1320 LOCALA%,B%,C%,D%
 1330 FORA%=1TO8:PROCtime
 1340 C%=-1
 1350 LC%=0
 1360 FORB%=1TO8
 1370 D%=A%(A%,B%)
 1380 IFD%=1 DC%=1 ELSE IFD%=0 DC%=-1

 1390 IFC%=D%:LC%=LC%+1:SP%=SP%+DC%*2
^LC% ELSE C%=D%:LC%=0
 1400 IFC%=7 C%=-1
 1410 IFLC%<4 OR CP%=1 GOTO1430
 1420 IFD%=1 CW%=1 ELSE HW%=1
 1430 NEXT
 1440 NEXT
 1450 FORA%=1TO8:PROCtime
 1460 C%=-1
 1470 LC%=0
 1480 FORB%=1TO8
 1490 D%=A%(B%,A%)
 1500 IFD%=1 DC%=1 ELSE IFD%=0 DC%=-1

 1510 IFC%=D%:LC%=LC%+1:SP%=SP%+DC%*2
^LC% ELSE C%=D%:LC%=0
 1520 IFC%=7 C%=-1
 1530 IFLC%<4 OR CP%=1 GOTO1550
 1540 IFD%=1 CW%=1 ELSE HW%=1
 1550 NEXT
 1560 NEXT:ENDPROC

 1570 DEFPROCsound:SD%=SD%+1
 1580 ON SD% GOTO1590,1610
 1590 *FX210,0
 1600 GOTO1630
 1610 *FX210,1
 1620 SD%=0
 1630 REPEATUNTILNOTINKEY(-82):ENDPRO
C

 1640 DEFPROCgame_over:VDU31,5,2,130,
157,129,141:PRINTSPC6"GAME OVER";STRI
NG$(5," ");:VDU31,5,3,130,157,129,141
:PRINTSPC6"GAME OVER";STRING$(5," ");
:FORKK%=1TO3:FORZZ%=1TO220STEP17:SOUN
D1,-15,ZZ%,1:SOUND1,-15,ZZ%+39,1:NEXT
ZZ%,KK%
 1650 VDU31,6+X%*3,5,32,28,8,22,30,7:
CLS:VDU26
 1660 IFHW%=1 AND CW%=1 VDU31,15,8,13
1,136:PRINT"Good!"CHR$132:VDU31,10,10
,129:PRINT"We drew this game"CHR$132:
GOTO1690
 1670 IFHW%=1 VDU31,11,8,131,136:PRIN
T"Well Ployed!!!"CHR$132:VDU31,15,10,
129:PRINT"You win"CHR$132:GOTO1690
 1680 IFCW%=1 VDU31,9,8,131,136:PRINT
"Tough luck Hume!!!"CHR$132:VDU31,15,
10,129:PRINT"You lose"CHR$132
 1690 VDU31,12,12,135:PRINT"After";CH
R$129;MV%;CHR$135"moves":PROCploy:PRO
Cinit_title:PROCtitle:VDU31,0,24:FORX
%=1TO25:FORY%=1TO200:NEXT:PRINT:NEXT:
RUN

 1700 DEFPROCinit_title:CT%=0:PL2$=CH
R$135:PL$=STRING$(2," ")+CHR$135+STRI
NG$(3,CHR$91)+CHR$132+"PLOY"+CHR$135+
STRING$(3,CHR$93)+STRING$(7," ")
 1710 PL$=PL$+CHR$132+"by"+STRING$(2,
" ")+CHR$129+"R.Nixon"+STRING$(6," ")
+CHR$135+"(c)"+CHR$32+CHR$129+"Micro
User"+CHR$133+"1986"+CHR$129+STRING$(
7," "):ENDPROC

 1720 DEFPROCtitle:VDU31,8,20,134,141
:PRINT"Push a key or switch";:VDU31,8
,21,134,141:PRINT"Push a key or switc
h";
 1730 REPEATPL1$=PL2$+LEFT$(PL$,21):V
DU31,5,2,130,157,141,132:PRINTPL1$;:V
```

```
DU31,5,3,130,157,141,132:PRINTPL1$;
 1740 PL$=RIGHT$(PL$,LEN(PL$)-1)+LEFT
$(PL$,1):IFASC(LEFT$(PL$,1))>127 PL2$
=LEFT$(PL$,1)
 1750 CT%=CT%+1:IFCT%=20 OR CT%=43 OR
 CT%=70 THEN TIME=0:REPEATUNTILTIME=2
00 OR(ADVAL(0)AND3)>0 OR INKEY(-74) O
R INKEY(-99):IFCT%=70 CT%=0
 1760 UNTIL(ADVAL(0)AND3)>0 OR INKEY(
-74) OR INKEY(-99):REPEATUNTIL(ADVAL(
0)AND3)=0 AND INKEY(-74)=0 AND INKEY(
-99)=0:SOUND1,-15,30,1:ENDPROC
 1770 DATA 11,130
 1780 DATA The object of this
 1790 DATA game is to get a line
 1800 DATA of 5 counters in
 1810 DATA either a horizontal
 1820 DATA or vertical direction
 1830 DATA by moving rows of
 1840 DATA counters left or
 1850 DATA right by one position.
 1860 DATA I can move columns of
 1870 DATA counters up or down
 1880 DATA by one position.
 1890 DATA 10,134
 1900 DATA After each go my last
 1910 DATA move is shown at the
 1920 DATA top of the column I
 1930 DATA moved.
 1940 DATA
 1950 DATA A 'U' shows that I
 1960 DATA moved that column up.
 1970 DATA
 1980 DATA A 'D' shows that I
 1990 DATA moved it down.
 2000 DATA 8,129
 2010 DATA To select a row press
 2020 DATA the SPACE bar.
 2030 DATA
 2040 DATA (A black line shows
 2050 DATA the current row)
 2060 DATA
 2070 DATA When you have chosen
 2080 DATA a row press RETURN.
 2090 DATA 7,131
 2100 DATA To choose between
 2110 DATA moving the row left
 2120 DATA or right you press
 2130 DATA the SPACE bar.
 2140 DATA
 2150 DATA And to enter your
 2160 DATA go you press RETURN.
 2170 DATA 10,134
 2180 DATA Pressing 'S' will
 2190 DATA alternate between
 2200 DATA turning the sound on
 2210 DATA and off.
 2220 DATA
 2230 DATA My counters are green.
 2240 DATA Yours are red.
 2250 DATA
 2260 DATA
 2270 DATA GOOD LUCK!!
```

This listing is included in this month's cassette tape offer. See order form on Page 183.

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MU 2

From Page 103

```
  60 RESTORE110:FORX=&CDA TO &CF9:RE
AD A:?X=A:NEXT
  70 FORS=&B00 TO &B3F:READ A:?S=A:N
EXT
  80 DATA21,63,63,21,0,16,32,32,42,6
3,63,63,63,21,3,3,0,21,53,53,53,53,1,
1,63,63,63,63,42,16,2,2,0,42,42,0,0,0
,32,32
  90 DATA1,200,53,1,24,54,1,104,54,1
,80,58,1,160,58,1,240,58,1,64,59,1,14
4,59,1,224,59,1,40,63,1,120,63,1,200,
63,1,24,64,1,104,64,1,184,64,1,8,65,1
,40,68,1,120,68,1,200,68,1,24,69,1,10
4,69,1,184,69,1,8,70
  100 DATA0,0,0,42,42,63,63,63,0,0,0,
21,63,42,1,1,42,42,42,63,21,2,3,1,0,0
,0,0,42,63,21,21,0,0,0,42,42,42,42,42

  110 DATA0,0,2,0,5,0,10,0,1,0,1,0,10
0,0,10,0,2,0,3,0,110,0,10,0,0,0,4,0,6
,0,20,0
  120 DATA 48,199,50,231,55,71,57,39,
58,199,60,135,63,167,66,199,70,7,71,7
,73,7,77,103,79,7,82,7,85,91,86,7
  130 DATA 88,199,90,231,95,71,97,39,
98,199,100,135,103,167,106,199,110,7,
111,7,113,7,117,103,119,7,122,7,125,9
1,126,7
  140 *T.
  150 FORX=0TO3STEP3
  160 P%=&DA0
  170 [OPT0
  180 .BEG:LDA#160:STA&70:LDA#126:STA
&71:LDA#0:STA&90:STA&91:STA&80:LDA#3:
STA&92
  190 .SRT:LDY#0:.SU:TYA:TAX:LDA&C95,
X:STA&C28,Y:INY:CPY#69:BNE SU:LDA#0:S
TA&8A:STA&8B
  200 .ST:LDA#12:JSR D:LDA#0:STA&74:L
DA#12:STA&84:LDA#0:STA&85:LDA&83:CMP#
109:BNE OKK:LDA#40:STA&83:.OKK:LDA#0:
STA&8E
  210 JSR SC:JSR LV:JSR HISC
  220 .LOOP:LDA#&81:LDX#&9E:LDY#&FF:J
SR&FFF4:TXA:CMP#&FF:BEQ L
  230 .CHR:LDA#&81:LDX#&BD:LDY#&FF:JS
R&FFF4:TXA:CMP#&FF:BEQ R
  240 .CHF:LDA#&81:LDX#&B6:LDY#&FF:JS
R&FFF4:TXA:CMP#&FF:BEQ F
  250 JMP PRONSC
  260 .L:JMP LE:.R:JMP RI:.F:JMP FI:.
H:JMP HI:.CR:CMP#20:BEQ RE:JSR EX:DEC
&92:LDA&92:CMP#0:BNE LL:JSR LV:RTS:.L
L:JSR FINI:JMP ST:.RE:JMP RETT:.C:JMP
 CR
  270 .PRONSC
  280 LDY#0:.IVLP:LDA&C28,Y:STA&75:IN
Y:LDA&C28,Y:STA&76:INY:LDA&C28,Y:STA&
77:INY:LDA&75:CMP#0:BEQ NOSP:TYA:PHA:
LDY#0:.PRIV:LDA&C00,Y:STA(&76),Y:INY:
CPY#40:BNE PRIV:PLA:TAY:.NOSP:CPY#69:
BNE IVLP
  290 LDA&74:CMP#0:BEQ NOSH
  300 LDA&72:CLC:ADC#2:STA&78:LDA#0:A
DC&73:STA&79
  310 LDX#0:LDA(&78,X):CMP#0:BNE H
  320 LDX#0:LDA(&72,X):CMP#0:BNE H
  330 LDY#0:.SHLP:LDA#2:STA(&72),Y:IN
Y:CPY#8:BNE SHLP
  340 .NOSH
  350 LDY#0:.CCKLP:LDA(&70),Y:CMP#0:B
NE C:.RETT:INY:CPY#40:BNE CCKLP
  360 LDY#0:.LOOP1:LDA&C6D,Y:STA(&70)
,Y:INY:CPY#40:BNE LOOP1
  370 LDA#19:JSR&FFF4
  380 INC&8E:LDA&8E:CMP#5:BNE GO:JSR
SRS:LDA#0:STA&8E
  390 .GO
  400 LDY#0:.LOOP2:LDA#0:STA(&70),Y:I
NY:CPY#40:BNE LOOP2
  410 LDA&74:CMP#0:BEQ NOSH1
  420 LDY#0:.SHLP:LDA#0:STA(&72),Y:IN
Y:CPY#8:BNE SHLP
  430 DEC&73:DEC&73:LDA&72:SEC:SBC#12
8:STA&72:BCS D1:DEC&73:.D1:INC&74:LDA
&74:CMP#30:BNE NOSH1:LDA#0:STA&74
  440 .NOSH1
  450 JSR SW
  460 LDA&80:CMP#23:BNE OWD:JMP NW:.O
WD
  470 INC&8A:LDA&8A:CMP#15:BEQ MOVM
  480 .BACK
  490 JMP LOOP
  500 .MOVM:LDA#0:STA&8A
  510 LDY#0:.IVLP1:LDA&C28,Y:STA&75:I
NY:LDA&C28,Y:STA&76:INY:LDA&C28,Y:STA
&77:INY:LDA&75:CMP#0:BEQ NOSP1:TYA:PH
A:LDY#0:.PRIV1:LDA#0:STA(&76),Y:INY:C
PY#40:BNE PRIV1:PLA:TAY:.NOSP1:CPY#69
:BNE IVLP1
  520 LDA&8B:CMP#5:BCS MVLT:LDY#0:.CH
LP:INY:LDA&C28,Y:CLC:ADC#8:STA&C28,Y:
INY:LDA&C28,Y:ADC#0:STA&C28,Y:INY:CPY
#69:BNE CHLP
  530 LDA&86:CLC:ADC#8:STA&86:LDA#0:A
DC&87:STA&87
  540 LDA&88:CLC:ADC#8:STA&88:LDA#0:A
DC&89:STA&89
  550 INC&8B:JMP BACK
  560 .MVLT:LDY#0:.CHLP1:INY:LDA&C28,
Y:SEC:SBC#8:STA&C28,Y:INY:LDA&C28,Y:B
CS D4:SEC:SBC#1:.D4:STA&C28,Y:INY:CPY
#69:BNE CHLP1
  570 LDA&86:SEC:SBC#8:STA&86:BCS D5:
DEC&87:.D5
  580 LDA&88:SEC:SBC#8:STA&88:BCS D6:
DEC&89:.D6
  590 INC&8B:LDA&8B:CMP#10:BNE NY:LDA
#0:STA&8B
  600 .NY:JMP BACK
  610 .NW:LDA#0:STA&80:JMP SRT
  620 .LE:LDA&71:CMP#125:BNE NOL:LDA&
70:CMP#128:BNE NOL:JMP CHR:.NOL:LDA &
70:SEC:SBC#8:STA &70:BCS D2:DEC &71:.
D2:JMP CHR
  630 .RI:LDA&71:CMP#127:BNE NOR:LDA&
70:CMP#216:BNE NOR:JMP CHF:.NOR:LDA &
70:CLC:ADC#8:STA &70:LDA#0:ADC &71:ST
A &71:JMP CHF
  640 .FI:LDA&74:CMP#0:BEQ NF:JMP PRO
NSC:.NF:LDA#21:LDX#5:JSR&FFF4:LDA#7:L
DX#226:LDY#12:JSR&FFF1
  650 LDA&70:STA&72:LDA&71:STA&73:DEC
&73:DEC&73:LDA&72:SEC:SBC#112:STA&72:
BCS D:DEC&73:.D:LDA#1:STA&74
  660 JMP PRONSC
  670 .HI
  680 LDA#21:LDX#4:JSR&FFF4:LDA#7:LDX
#218:LDY#12:JSR&FFF1
  690 INC&80
  700 LDA&72:STA&78:LDA&73:STA&79
  710 .CKLP:LDY#68:.CHLP:LDA&C28,Y:CM
P&79:BEQ EQ:DEY:DEY:DEY:.CON:CPY#255:
BNE CHLP:LDA&78:SEC:SBC#8:STA&78:BCS
D3:DEC&79:.D3:JMP CKLP
  720 .EQ:DEY:LDA&C28,Y:CMP&78:BEQ DE
L:DEY:DEY:JMP CON
  730 .DEL:DEY
  740 LDA#0:STA&C28,Y:LDY#0:.DELP:LDA
#0:STA(&78),Y:INY:CPY#40:BNE DELP:LDA
#0:STA&74
  750 SED:CLC:LDA&90:ADC#1:STA&90:LDA
&91:ADC#0:STA&91:CLD:JSR SC
  760 JMP NOSH
  770 .SW
  780 LDX#0:LDA(&83,X):CMP#0:BEQ FINH
  790 LDA&85:CMP#0:BNE ALSW:INC&83:LD
A(&83,X):STA&88:STA&86:INC&83:LDA(&83
,X):STA&89:STA&87:DEC&83:DEC&83
  800 LDA#21:LDX#6:JSR&FFF4:LDA#7:LDX
#234:LDY#12:JSR&FFF1
  810 .ALSW
  820 LDY#0:.DELP1:LDA#0:STA(&86),Y:I
NY:CPY#40:BNE DELP1
  830 JSR MOVSP
  840 LDY#1:LDA&86:STA(&83),Y:INY:LDA
&87:STA(&83),Y
  850 INC&85:LDA&85:CMP#30:BEQ FINI
  860 RTS
  870 .FINI
  880 LDA#0:STA&85:LDY#1:LDA&88:STA(&
83),Y:INY:LDA&89:STA(&83),Y
  890 .FINH
  900 INC&83:INC&83:INC&83:LDA&83:CMP
#109:BNE OK:LDA#40:STA&83
  910 .OK:LDA#0:STA&85
```

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```
 920 RTS
 930 .MOVSP:LDA&85:CMP#10:BCS OV:INC
&87:INC&87:LDA&86:CLC:ADC#136:STA&86:
LDA&87:ADC#0:STA&87:RTS
 940 .OV:LDA&85:CMP#20:BCS OV1:INC&8
7:INC&87:LDA&86:CLC:ADC#120:STA&86:LD
A&87:ADC#0:STA&87:RTS
 950 .OV1:INC&87:INC&87:LDA&86:CLC:A
DC#136:STA&86:LDA&87:ADC#0:STA&87:RTS
 960 .SRS
 970 LDY#0:LDX#0:.S:LDA&B00,X:STA&8D
:INX:LDA&B00,X:STA&8C:INX:LDA#0:STA(&
8C),Y:CPX#64:BNE S
 980 LDY#0:.MSLP:LDA&B00,Y:STA&8C:CM
P#126:BCS OVER:INY:LDA&B00,Y:CLC:ADC#
128:STA&B00,Y:LDA#2:ADC&8C:DEY:STA&B0
0,Y:.RET:INY:INY:CPY#64:BNE MSLP
 990 LDY#0:LDX#0:.S1:LDA&B00,X:STA&8
D:INX:LDA&B00,X:STA&8C:INX:LDA#20:STA
(&8C),Y:CPX#64:BNE S1
 1000 RTS
 1010 .OVER:SEC:SBC#80:STA&B00,Y:JMP
RET
 1020 .SC
 1030 LDA#31:JSR O:LDA#0:JSR O:LDA#0:
JSR O
 1040 LDA#83:JSR O:LDA#67:JSR O
 1050 LDA&91:LSR A:LSR A:LSR A:LSR A:
CLC:ADC#&30:JSR O
 1060 LDA&91:AND#&F:CLC:ADC#&30:JSR O

 1070 LDA&90:LSR A:LSR A:LSR A:LSR A:
CLC:ADC#&30:JSR O
 1080 LDA&90:AND#&F:CLC:ADC#&30:JSR O

 1090 LDA#&30:JSR O
 1100 RTS
 1110 .LV
 1120 LDA#31:JSR O:LDA#17:JSR O:LDA#0
:JSR O
 1130 LDA#76:JSR O:LDA#73:JSR O
 1140 LDA#&30:CLC:ADC&92:JSR O
 1150 RTS
 1160 .EX:LDY#0:.EXL:TYA:ROL A:STA(&7
0),Y:INY:CPY#40:BNE EXL
 1170 LDA#21:LDX#4:JSR&FFF4:LDA#7:LDX
#242:LDY#12:JSR&FFF1
 1180 LDY#0:.EXDL:LDX#0:.EXDL2:INX:CP
X#0:BNE EXDL2:INY:CPY#100:BNE EXDL:RT
S
 1190 .HISC:LDA#31:JSR O:LDA#8:JSR O:
LDA#0:JSR O:LDA#72:JSR O:LDA#73:JSR O
 1200 LDA&94:LSR A:LSR A:LSR A:LSR A:
CLC:ADC#&30:JSR O
 1210 LDA&94:AND#&F:CLC:ADC#&30:JSR O
 1220 LDA&93:LSR A:LSR A:LSR A:LSR A:
CLC:ADC#&30:JSR O
 1230 LDA&93:AND#&F:CLC:ADC#&30:JSR O
 1240 LDA#&30:JSR O
 1250 RTS:]
 1260 NEXT:CLS
 1270 GOTO1320
 1280 ?&83=40+(3*(RND(22))):CALL BEG
 1290 IF?&91>?&94 ?&94=?&91:?&93=?&90
:CALL HISC
 1300 IF?&91=?&94 AND ?&90>?&93 ?&94=
?&91:?&93=?&90:CALL HISC
 1310 PRINTTAB(5,15)"GAME OVER"
 1320 COLOUR15:PRINTTAB(0,17)"PRESS A
 KEY TO START"
 1330 *FX15,1
 1340 COLOUR7:G=GET:GOTO1280
```

This listing is included in this month's cassette tape offer. See order form on Page 183.

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From Page 95

```
    0 REM TIPAKA (c) The Micro User
    2 REM By G.J KEY
   10 DATA/A0A5656;K;K<6<6IRIRC=C=BXB
/X<R<R5G5G0.40P.V0<.VBI
   20 DATA/0B6B6I?I?;A;AIRIRBXB/0<6<6
5G56CICI5R5R<X<.4BP.SBI.0;I.40<.H5C.S
5<
   30 DATA/0B6B6IRIRCDCDBXB/X<R<R5G56
0/A0A5656;K;K<><>C<C<<0<.SBP.4BI.40<.
=<C.S0<
   40 DATA/0B6B6IRIR5G5G0/A0A;K;KCICI
<?<?5656<0<.S0P.4BI.40<.05<.J<C
   50 DATA/A0A5656;K;K<6<6IAIAN/GNGIR
IRC=C=BRBR5G5G0.40P.S0P
   60 DATA/0B6B6IAIAP/GPG<A<AC?C?;I;I
IRIRBXB/0<6<65R5R<X<.40<.S5<.4BP.SBP.
0;C.H<I
   70 DATA/0BKBKC6C6IAIAP/GNGIRIR<=<=
;R;R5656<0<.40<.4BP.S5P
   80 DATA/APAI6I65R5R<X</XB>B><K<K;<
;<CRCRIGIGP.40P.S5<.=;C.SCP
   90 DATA15,117,109,101,97,117,109,1
01,97,81,109,81,109,73,0,117
  100 DATA19,89,0,89,0,89,0,81,73,69,
0,69,73,81,89,97,0,69,0,89
  110 DATA27,101,0,101,0,101,0,101,10
9,117,0,121,0,129,0,137,129,117,109,1
01,97,89,0,81,0,73,73,73
  120 DATA10,89,97,101,89,97,101,117,
109,101,97
  200 IFTOP>&2FFF PROCshorten
  205 MODE2
  210 PROCinit
  215 S%=-2:PROChiscore
  220 REPEAT:S%=FALSE:L%=1:W%=FALSE:F
%=5
  225 REPEAT:PROCquest
  230 REPEAT:IFF%>FALSE REPEAT:FORI%=
FALSE TOZ%:PROCg:NEXT:UNTILTIME>D%
  235 IFNOTW%J%=FALSE:j%=&C:K%=&400:k
%=&3F8:H%=FALSE:I%=1:SOUND3,4,&64,&64
:REPEAT:PROCp:PROCg:UNTILH%
  240 UNTILW%:UNTILF%<1
  245 SOUND&13,0,0,0:IFNOTF%PROClose
ELSEPROCwin
  250 UNTILFALSE
```

```
 1000 DEFPROCquest
 1005 IFL%=1VDU23,245,16,56,40,40,56,
16,16,16,23,246,16,16,16,16,20,28,20,
16
 1010 IFL%=2VDU23,245,16,16,16,16,16,
16,16,16,23,246,16,16,16,16,56,56,56,
56
 1015 IFL%=3VDU23,245,36,36,36,60,24,
24,24,24,23,246,24,24,24,24,60,36,36,
36
 1020 IFL%=4ENDPROC
 1025 PROCcls
 1030 PROCtde(229,812,"YOU MUST FIND"
)
 1035 PROCtde(599,598,CHR$245+CHR$8+C
HR$10+CHR$246)
 1040 PROCtde(289,312,"PRESS SPACE")
 1045 PROCtde(325,212,"WHEN READY")
 1050 FORN%=2TO20:t?N%=-(RND(L%+3)=1)
:MX%(N%)=320+(RND(3)-1)*320:MY%(N%)=2
80+(RND(3)-1)*220:NEXT:t?(1+RND(19))=
2
 1055 MX%(1)=&280:MY%(1)=&200
 1060 TX%=320+(RND(3)-1)*320:TY%=280+
(RND(3)-1)*220:t?1=3
 1065 *FX21
 1070 PROCspc:PROCstart
 1075 ENDPROC
```

```
 2000 DEFPROCcls
 2005 FORI%=0TO7:VDU19,I%,I%;0;:NEXT
 2010 VDU26,4:COLOUR133:VDU12,5
 2015 I%=TIME:REPEATUNTILTIME>I%+50
 2020 ENDPROC
 2025 MODE7
```

```
 3000 DEFPROClose
 3005 PROCcls
 3010 PROCtune(2)
 3015 PROCtde(229,812,"YOU HAVE LOST"

 3020 PROCtde(325,598,"BUT SCORED")
 3025 PROCrego
 3030 ENDPROC
```

```
 4000 DEFPROCwin
 4005 PROCcls
 4010 PROCtune(3)
 4015 PROCtde(165,812,"CONGRATULATION
S")
 4020 PROCtde(261,748,"YOU HAVE WON")
 4025 PROCtde(325,598,"AND SCORED")
 4030 PROCrego
 4035 ENDPROC
```

```
 5000 DEFPROCrego
 5005 PROCtde(640-LENSTR$S%*32,534-N%
/2,STR$S%)
 5010 PROCtde(289,312,"PRESS SPACE")
 5015 PROCtde(229,212,"FOR HI-SCORES"
)
 5020 PROCspc
 5025 PROChiscore
 5030 ENDPROC
```

```
 6000 DEFPROCtde(X%,Y%,A$)
 6005 FORN%=0TO7STEP7
 6010 GCOL0,N%
 6015 MOVEX%-N%,Y%-N%DIV2:PRINTA$
 6020 NEXT
 6025 ENDPROC
```

```
 7000 DEFPROCspc
 7005 *FX21
 7010 REPEATUNTILGET=32
 7015 ENDPROC
```

```
 8000 DEFPROCg
 8005 IFI%AND1PROCm
 8010 CALLC%,m%(T%),n%(I%),o%(I%)
 8015 IF?U%A%=?U%:PROCb
 8020 IFB%PROCf
 8025 ENDPROC
```

```
 9000 DEFPROCp
 9005 GCOL3,9:MOVEJ%,K%:VDU&FE,8,&A,&
FF
 9010 MOVEj%,k%:VDU&FE,8,&A,&FF
 9015 J%=j%:K%=k%
 9020 j%=J%+((X%<J%)-(X%>J%))*36
 9025 k%=K%+((Y%<K%)-(Y%>K%))*24
 9030 ENDPROC
```

```
10000 DEFPROCf
10005 GCOL3,V%:PLOT69,x%,y%
10010 x%=x%+h%:y%=y%+v%
10015 IFs%s%=s%+TRUE ELSEIFINKEYf%B%=
FALSE:ENDPROC
10020 P%=POINT(x%,y%)+POINT(x%+V%,y%)
:IFP%=FALSE PLOT69,x%,y%:ENDPROC
10025 B%=FALSE:IFP%=9j%=&7D0:k%=-&3E8
:SOUND0,-&F,5,6:S%=S%+&12C:PROCsc:END
PROC
10030 IFP%>FALSE ANDP%<70%?P%=&F*(5-L
%):S%=S%+5:PROCsc:SOUND0,-&F,5,6
10035 ENDPROC
```

```
11000 DEFPROCsc
11005 VDU4:PRINTTAB(6,0);S%:VDU5
11010 ENDPROC
```

```
12000 DEFPROCm
12005 IFINKEYl%X%=X%+&14:T%=FALSE
12010 IFINKEYr%X%=X%-&14:T%=1
12015 IFINKEYu%Y%=Y%-&10:T%=2
12020 IFINKEYd%Y%=Y%+&10:T%=3
12025 IFB%ENDPROC
12030 IFINKEYf%B%=TRUE:s%=8:GCOL3,&C:
PROCd:PLOT69,x%,y%:SOUND&11,1,&78,&A
12035 ENDPROC
```

```
13000 DEFPROCd
13005 IFT%=0:x%=X%+72:y%=Y%-20:h%=24:
v%=FALSE:ENDPROC
13010 IFT%=1:x%=X%-12:y%=Y%-20:h%=-24
```

```
:v%=FALSE:ENDPROC
13015 IFT%=2:x%=X%+24:y%=Y%-68:h%=FAL
SE:v%=-24:ENDPROC
13020 x%=X%+24:y%=Y%+16:h%=FALSE:v%=2
4
13025 ENDPROC

14000 DEFPROCb
14005 IFA%=7PROCwrm:ENDPROC
14010 IFA%<7SOUND&10,2,0,40:PROCwink(
A%):ENDPROC
14015 IFA%=8ORA%=12ORA%=14SOUND&10,3,
0,20:PROCwink(8):ENDPROC
14020 IFA%=9SOUND&13,3,4,2:SOUND&10,3
,4,20:PROCwink(9):ENDPROC
14025 IFA%=&D:FORI%=254TO1:SOUND&12,-
15,I%,1:NEXT:GCOL3,13:MOVEMX%(R%),MY%
(R%):VDU247:S%=S%+100:PROCsc:t?R%=0:F
%=F%+1:VDU4:PRINTTAB(6,1);F%:VDU5:END
PROC
14030 IFA%=&F PROCtune(4):GCOL3,15:MO
VETX%,TY%:VDU245,10,8,246:S%=S%+2000:
PROCsc:t?R%=0:c%=TRUE:VDU19,10,2;0;:E
NDPROC
14035 IFA%=&A IFc% PROCtune(1):L%=L%+
1:S%=S%+5000:IFL%<4PROCquest
14040 IFL%>3W%=TRUE:TIME=D%+1:H%=TRUE
:F%=TRUE
14045 ENDPROC

15000 DEFPROCtune(P%)
15005 RESTORE(80+P%*10):READP%
15010 FORI%=1TOP%:READN%
15015 SOUND1,15*(N%>0),N%,3
15020 M%=TIME:REPEATUNTILTIME>M%+7
15025 SOUND2,15*(N%>0),N%,3:NEXT
15030 ENDPROC

16000 DEFPROCwink(A%)
16005 N%=6:M%=TIME:REPEAT:VDU19,A%,(T
IME AND&70)DIV&10;0;
16010 REPEATUNTILTIME MOD5=0
16015 VDU19,13,N%;0;19,15,N%;0;:N%=RN
D(7)
16020 IFA%=9PROCp
16025 REPEATUNTILTIME MOD5=0
16030 UNTILTIME>M%+400
16035 OX%=X%:OY%=Y%:X%=3000:Y%=3000
16040 CALLC%,m%(T%),n%(I%),o%(I%)
16045 MOVEOX%,OY%-24:GCOL0,13:VDU240:
GCOL0,14:VDU8,241:GCOL0,15:VDU242
16050 SOUND&10,-15,6,10:PROCcol
16055 M%=TIME:REPEATUNTILTIME>M%+300:
F%=F%-1:IFF%=FALSE W%=TRUE:I%=Z%:CLG:
TIME=&2000:H%=TRUE
16060 IFc%t?R%=2:S%=S%-1800
16065 PROCstart
16070 ENDPROC

17000 DEFPROCstart
17005 IFL%=4:W%=TRUE:ENDPROC
17010 R%=1:T%=1:X%=928:Y%=712:c%=FALS
E
17015 PROCcol
17020 m%(0)=&E3E2E4:m%(1)=&1E7E6E8:m%
(2)=&EBEAEC:m%(3)=&EFEEEC
17025 PROCroom
17030 ENDPROC

18000 DEFPROCcol
18005 IFL%=1M%=3:N%=1:I%=2 ELSEIFL%=2
M%=6:N%=4:I%=3 ELSEIFL%=3M%=7:N%=5:I%
=5
18010 VDU19,7,0;0;19,8,7;0;19,9,6;0;1
9,11,I%;0;19,12,M%;0;19,13,3;0;19,14,
N%;0;19,15,2;0;
18015 ENDPROC

19000 DEFPROCwrm
19005 IFX%>1172 X%=58:R%=R%+1
19010 IFX%<58 X%=1172:R%=R%-1
19015 IFY%<94 Y%=916:R%=R%+5
19020 IFY%>916 Y%=94:R%=R%-5
19025 m%(T%)=m%(T%)+&1000000
19030 PROCroom
19035 ENDPROC

20000 DEFPROCroom
20005 SOUND&13,0,0,0
20010 IFL%=4F%=TRUE
20015 IFF%<1ENDPROC
20020 D%=(4.5-L%)*&3E8
20025 VDU19,10:IFc%VDU2;0;ELSEVDU1;0;
20030 FORI%=0TO5:I%?&88=I%*5:NEXT
20035 B%=FALSE:H%=TRUE
20040 FORI%=0TO5:n%(I%)=MX%(R%)+I%*8+
MY%(R%)*&10000:o%(I%)=&100E0+(I%)*&10
0+(I%+1)*&1000000:NEXT
20045 VDU26,4:COLOUR&87:CLS
20050 RESTOREr?R%*&A
20055 VDU28,0,2,19,0
20060 VDU4:COLOUR11:PRINTTAB(0,0)"SCO
RE:";S%;TAB(13)"ROOM:";R%;:PRINTTAB(0
,1)"LIVES:";F%;TAB(13,1)"LEVEL:";L%;C
HR$30
20065 GCOL0,8:MOVE1,952:DRAW1279,952:
DRAW1279,1:DRAW1,1:DRAW1,952
20070 VDU5,24,52;32;1237;927;:CLG
20075 READA$
20080 O%=LENA$:I%=1
20085 REPEAT
20090 E%=FNread
20095 IFE%=-64G%=12:M%=FNread:FORN%=F
Nread TOFNread STEP4:GCOL69,G%:G%=G%E
OR2:PLOT77,M%,N%:NEXT:MOVE0,0:UNTILFA
LSE
20100 IFE%=-32 P%=4 ELSE I%=I%-1:P%=5
20105 GCOL0,B
20110 IFE%>-33VDU25,P%,FNread;FNread;
20115 UNTILI%>O%
20120 GCOL3,7:MOVE54,34:DRAW54,926:DR
AW1236,926:DRAW1236,34:DRAW54,34
20125 VDU24,0;0;1279;959;
20130 IFR%=1GCOL0,10:MOVE1000,720:VDU
243,8,10,244
20135 TIME=FALSE
20140 IFt?R%=2GCOL0,15:MOVETX%,TY%:VD
U245,10,8,246
20145 IFt?R%=1GCOL0,13:MOVEMX%(R%),MY
%(R%):VDU247
20150 IFR%=1Z%=5ELSEZ%=RND(3)*2-1
20155 IFt?R%=0GCOL0,8:MOVEMX%(R%),MY%
(R%):VDU252,10,8,253
20160 IFZ%=5VDU23,224,0,0,40,40,16,16
,40,40,23,225,0,0,16,16,56,56,16,16
20165 IFZ%=3VDU23,224,0,0,56,56,16,16
,56,56,23,225,0,0,40,40,56,56,40,40
20170 IFZ%=1VDU23,224,0,0,68,56,40,40
,56,68,23,225,0,0,0,56,40,40,56,0
20175 FORI%=1TO6:VDU19,I%,12+Z%MOD5;0
;:NEXT
20180 ENDPROC

21000 DEFFNread
21005 I%=I%+1
21010 =(ASC(MID$(A$,I%-1,1))-48)*32

22000 DEFPROCinit
22005 A$=STRING$(71,"*"):A$=""
22010 DIMn%(5),o%(5),m%(3),r 20,t 20,
MX%(20),MY%(20),HS$(8),HS%(8)
22015 FORT%=0TO8:HS$(T%)=STRING$(9,"
"):HS$(T%)="":NEXT
22020 *fx10,3
22025 *fx9,3
22030 @%=&87:U%=&8F:V%=12:X%=RND(-TIM
E)
22035 f%=-99:l%=-67:r%=-98:u%=-105:d%
=-73
22040 RESTORE22055:FORT%=1TO20:READr?
T%:NEXT
22045 FORT%=0TO8:READHS$(T%),HS%(T%):
NEXT
22050 ENDPROC
22055 DATA1,2,3,2,4,5,1,6,4,5,5,5,1,7
,5,8,6,6,2,7
22060 DATALUBILU,20985,J.T.KIRK,18740
,B.MIBBY,17345,BILL,10525,BEN,9934,M.
THACHER,8885,R.HOOD,7640,P.PHILIP,505
0,N.KINNOCK,-1

23000 DEFPROChiscore
```

→

22065 ENDPROC

20050

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```
23005 IFS%>HS%(8)PROCinput
23010 PROCcls
23015 PROCtde(150,1000,"HIGH SCORE TA
BLE")
23020 FORT%=0TO8
23025 VDU19,7,3,0,0,0
23030 PROCtde(100,800-T%*64,HS$(T%))
23035 PROCtde(900,800-T%*64,STR$(HS%(
T%)))
23040 NEXT
23045 PROCtde(300,100,"PRESS SPACE")
23050 IFHS%(8)<>TRUE PROCtde(236,50,"
TO PLAY AGAIN")
23055 PROCtune(1)
23060 PROCspc
23065 PROCcls
23070 ENDPROC
```

```
24000 DEFPROCinput
24005 B$=""
24010 PROCcls
24015 VDU19,7,3,0,0,0:GCOL0,133
24020 PROCtde(214,812,"YOU ARE IN THE
")
24025 PROCtde(150,712,"HIGH SCORE TAB
LE")
24030 PROCtde(214,612,"PLEASE TYPE IN
")
24035 PROCtde(374,512,"YOUR NAME")
24040 X%=200:REPEAT
24045 A$=GET$
24050 PROCtde(X%,312,A$)
24055 IFA$<>CHR$127X%=X%+64:B$=B$+A$:
ELSEX%=X%-64:IFLENB$>0B$=LEFT$(B$,LEN
B$-1)
24060 UNTILA$=CHR$13:B$=LEFT$(B$,9)
24065 GCOL0,128
24070 FORT%=8TOFALSE STEP-1
24075 IFS%>HS%(T%)I%=T%
24080 NEXT
24085 FORT%=7TO(I%-1*-(I%>FALSE)) STE
P-1
24090 HS%(T%+1)=HS%(T%)
24095 HS$(T%+1)=HS$(T%)
24100 NEXT
24105 HS%(I%)=S%:HS$(I%)=B$
24110 ENDPROC
24115 THEEND
```

```
25000 DEFPROCcode
25005 A%=&EA:X%=0:Y%=&FF:IF(USR(&FFF4
)AND&FF00) DIM C% &400 ELSE C%=&900
25010 oswrch=&FFEE:osword=&FFF1
25015 FORN%=0TO2STEP2
25020 P%=C%
25025 [OPTN%
25030 LDA&601:STA&70
25035 LDA&602:STA&71
25040 LDA&604:STA&72
25045 LDA&605:STA&73
25050 RTS
25055 ]:NEXT:CALLC%,X%,Y%
25060 FORN%=0TO2STEP2
25065 P%=C%
25070 [OPTN%
25075 LDX#7:LDY#11
25080 .loop1
25085 LDA&600,Y:STA&74,X
25090 DEX:DEY
25095 LDA&600,Y:STA&74,X
25100 DEY:DEY:DEX
25105 BPLloop1
25110 LDY#3:LDA(&74),Y:BEQstart
25115 LDA#0:STA(&74),Y:JMPst
25120 .start
25125 JSRmov
25130 LDX#0:.loop2
25135 LDAwkspc1,X:JSRoswrch
25140 INX:CPX#4:BNEloop2
25145 LDX#14:JSRgcol
25150 LDAwkspc2+2:JSRoswrch
25155 LDA#8:JSRoswrch
25160 LDX#13:JSRgcol
25165 LDAwkspc2+1:JSRoswrch
25170 LDA#8:JSRoswrch
25175 LDA#10:JSRoswrch
25180 LDX#15:JSRgcol
25185 LDAwkspc2:JSRoswrch
25190 .st
25195 LDY#0:STY&83
25200 LDA(&70),Y:CMPwkspc1,Y:BNEl
25205 LDA(&72),Y:CMPwkspc1+2,Y:BNEl
25210 INC&83
25215 .l
25220 LDA&83:BNEnmov
25225 LDA(&74),Y:EOR#1:STA(&74),Y
25230 LDY#sound DIV256
25235 LDX#sound MOD256
25240 LDA#7:JSRosword
25245 LDY#0
25250 .nmov
25255 JSRmov
25260 .loop3
25265 LDA(&70),Y:STAwkspc1,Y:JSRoswrc
h
25270 INY:CPY#2:BNEloop3
25275 LDY#0:.loop4
25280 LDA(&72),Y:STAwkspc1+2,Y:JSRosw
rch
25285 INY:CPY#2:BNEloop4
25290 LDX#14:JSRgcol
25295 LDY#2
25300 LDA(&74),Y:STAwkspc2,Y:JSRoswrc
h
```

?

```
25305 LDA#8:JSRoswrch
25310 LDX#13:JSRgcol
25315 DEY
25320 LDA(&74),Y:STAwkspc2,Y:JSRoswrc
h
25325 LDA#8:JSRoswrch
25330 LDA#10:JSRoswrch
25335 LDX#15:JSRgcol
25340 DEY
25345 LDA(&74),Y:STAwkspc2,Y
25350 JSRoswrch:JSRmanst
25355 LDAblock:ADC#32:STAblock
25360 LDAblock+1:ADC#0:STAblock+1
25365 JSRrpix:STA&8F:JSRmanst
25370 JSRmrpix:JSRmanst
25375 CLC
25380 LDAblock:ADC#56:STAblock
25385 LDAblock+1:ADC#0:STAblock+1
25390 JSRmrpix
25395 SEC:LDAblock:SBC#32:STAblock
25400 LDAblock+1:SBC#0:STAblock+1
25405 JSRrpix:BEQlastp:STA&8F
25410 .lastp
25415 LDY#3
25420 .loop5
25425 LDA(&76),Y:STA&7C,Y
25430 LDA(&78),Y:STA&84,Y
25435 LDA#0:STA&80,Y
25440 DEY:BPLloop5
25445 LDA&86:BEQrst
25450 BPLrn
25455 RTS
25460 .rn
25465 LDA#0:STA&86:JMPmrob
25470 .rst
25475 JSRx
25480 JSRy
25485 JSRprob
25490 LDA&84:EOR#1:STA&84
25495 LDX&85:LDA&88,X:BEQmrob
25500 LDA#0:STA&87
25505 DEC&88,X:BNEout
25510 LDX&85:INX:STX&87
25515 .out
25520 JMPinrob
25525 .mrob
25530 LDY#2:.loop6
25535 CLC
25540 LDA&7C,Y:ADC&80,Y:STA&7C,Y
25545 LDA&7D,Y:ADC&81,Y:STA&7D,Y
25550 DEY:DEY:BPLloop6
25555 .inrob
25560 LDY#3
25565 .loop7
25570 CLC
25575 LDA&7C,Y:STA(&76),Y
25580 LDA&84,Y:STA(&78),Y
25585 DEY:BPLloop7
```

```
25590 LDX&85:JSRprob
25595 RTS
25600 .x
25605 SEC
25610 LDA&7E:SBC#24:STAblock+2
25615 LDA&7F:SBC#0:STAblock+3
25620 LDY#1:LDA&7D:CMP(&70),Y
25625 BEQlowx
25630 BCSleft
25635 .right
25640 CLC
25645 LDA&7C:ADC#48:STAblock
25650 LDA&7D:ADC#0:STAblock+1
25655 JSRrpix
25660 BNElevel
25665 LDA#16:STA&80
25670 .level
25675 RTS
25680 .left
25685 LDA&7C:STAblock
25690 LDA&7D:STAblock+1
25695 JSRrpix
25700 BNElevel
25705 LDA#240:STA&80
25710 LDA#255:STA&81
25715 RTS
25720 .lowx
25725 DEY
25730 LDA&7C:CMP(&70),Y
25735 BEQlevel
25740 BCSleft
25745 JMPright
25750 .y          ← ?
25755 CLC
25760 LDA&7C:ADC#24:STAblock
25765 LDA&7D:ADC#0:STAblock+1
25770 LDY#1:LDA&7F:CMP(&72),Y
25775 BEQlowy
25780 BCSdown
25785 .up
25790 LDA&7E:STAblock+2
25795 LDA&7F:STAblock+3
25800 JSRrpix
25805 BNElevel
25810 LDA#8:STA&82
25815 RTS
25820 .down
25825 SEC
25830 LDA&7E:SBC#36:STAblock+2
25835 LDA&7F:SBC#0:STAblock+3
25840 JSRrpix
25845 BNElevel
25850 LDA#248:STA&82
25855 LDA#255:STA&83
25860 RTS
25865 .lowy
25870 DEY
25875 LDA&7E:CMP(&72),Y
```

```
25880 BEQlevel
25885 BCSdown
25890 JMPup
25895 .prob
25900 JSRmov
25905 LDY#0
25910 .loop8
25915 LDA&7C,Y:JSRoswrch
25920 INY:CPY#4:BNEloop8
25925 LDX&87:JSRgcol
25930 LDA&84:JSRoswrch
25935 RTS
25940 .manst
25945 LDY#1:.loop9
25950 LDA(&70),Y:STAblock,Y
25955 LDA(&72),Y:STAblock+2,Y
25960 DEY:BPLloop9
25965 CLC
25970 LDAblock+2:ADC#4:STAblock+2
25975 LDAblock+3:ADC#0:STAblock+3
25980 RTS
25985 .mrpix
25990 LDA#5:STA&8E
25995 .loop10
26000 JSRrpix
26005 BEQmr
26010 STA&8F
26015 .mr
26020 SEC
26025 LDAblock+2:SBC#12:STAblock+2
26030 LDAblock+3:SBC#0:STAblock+3
26035 DEC&8E:BNEloop10
26040 RTS
26045 .mov
```

```
26050 LDA#25:JSRoswrch
26055 LDA#4:JSRoswrch
26060 RTS
26065 .gcol
26070 LDA#18:JSRoswrch
26075 LDA#3:JSRoswrch
26080 TXA:JSRoswrch
26085 RTS
26090 .rpix
26095 LDA#9
26100 LDX#block MOD256
26105 LDY#block DIV256
26110 JSRosword
26115 LDAblock+4
26120 RTS:]
26125 block=P%
26130 wkspc1=P%+5
26135 wkspc2=P%+9
26140 sound=P%+13
26145 P%!13=&FFFA0000
26150 P%!17=&10005
26155 NEXT
26160 A%=FALSE:B%=TRUE:FORT%=&900 TO&
BEC STEP4:A%=A%+!T%:B%=B%EOR!T%:NEXT:
IFA%<>&46104462 ORB%<>&1DCF208F THEN
VDU22,7,7,7,7,7:PRINTTAB(0,10)"THERE
IS AN ERROR IN PROCcode.":END
26165 ENDPROC
```

```
27000 DEFPROCchar
27005 VDU23,226,24,20,24,8;2;24
27010 VDU23,227;0;16,24,28,24,24
```

→

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```
27015 VDU23,228,24,24,24,24,28;0;
27020 VDU23,229,24,24,20,36,38;0;
27025 VDU23,230,24,40,24,16;64;24
27030 VDU23,231;0;8,24,56,24,24
27035 VDU23,232,24,24,24,24,56;0;
27040 VDU23,233,24,24,40,36,100;0;
27045 VDU23,234,56,16,56,16;16;56
27050 VDU23,235;0;40,124,40,56,56
27055 VDU23,236,56,56,40,104,8,12,0;
27060 VDU23,237,56,56,40,44,32,96,0;
27065 VDU23,238,56,56,56,16;0;56
27070 VDU23,239;0;40,124,56,56,56
27075 VDU23,240;0;32,32,81,113,121
27080 VDU23,241;0;0;7,15,7
27085 VDU23,242;96,32,32,32,32,224,22
4
27090 VDU23,243,126,255,195,219,219,1
95,195,219
27095 VDU23,244,219,195,195,219,219,1
95,255,126
27100 VDU23,247,60,126,255,24,60,24,2
4,24
27105 VDU23,252,126,255,153,153,231,6
6,126,60
27110 VDU23,253,66,195,36,24,24,36,19
5,66
27115 VDU23,254,60,126,153,153,255,19
5,189,126
27120 VDU23,255,126,126,60,60,28,24,4
8,96
27125 ENVELOPE1,1,8,-5,15,1,1,60,127,
0,127,126,-126,0
27130 ENVELOPE2,10,-5,-5,-5,10,10,10,
127,0,0,-2,126,0
27135 ENVELOPE3,12,-4,4,-4,20,20,20,1
26,-1,-1,-3,126,0
27140 ENVELOPE4,1,-1,1,1,20,10,10,0,0
,0,0,126,126
27145 ENDPROC
```

```
28000 DEFPROCinstruct
28005 VDU22,7,23;8202;0;0;0;:PROCtipa
ka
28010 FORI%=12TO13:PRINTTAB(3,I%)CHR$
134CHR$136CHR$141"DO YOU REQUIRE INST
RUCTIONS?":NEXT
28015 PROCtune(1)
28020 REPEATI%=GET OR32:UNTILI%=121OR
I%=110:PROCtipaka
28025 IFI%=110ENDPROC
28030 PRINT"You have been captured by
 the Logan Kingand imprisoned in the
castle of Tipaka! All you have to do
to escape is to find your way to the
roof of the castle wherea shuttle is
waiting to return you home."
28035 PRINT"This is not quite as easy
 as it sounds, for the castle is larg
e having three    levels, each with t
wenty rooms."'"Each of these levels i
s inhabited by    14 guard forms.  Co
mposed of six slow   Rotons, four Qub
oids, two fast ";
28040 PRINT"Machons"'"and a Loghost w
ith its attendant demon."'"The guard
forms increase in ferocity"'"with eac
h level."
28045 PROCget
28050 PRINT"The guard forms are attra
cted to the"'"jacket that you are for
ced to wear,"'"but can only enter a r
oom at a point of disturbance.  These
 points are created  by none moving o
bjects or the expulsion of a guard fo
rm."
28055 PRINT"The Loghost can travel th
rough solid    matter and can enter a
nywhere."'
28060 PRINT"You have been given a pul
se gun that"'"will usually expel any
guard form for a period that depends
inversely on the"'"room level and the
 guard forms status.  Guard forms can
not be killed."''"There is also the a
dded complication"
28065 PRINT"that the walls of the cas
tle are"'"electrified.":PROCget
28070 PRINT"In order to travel from o
ne level to thenext you must find cer
tain items and"'"return them to the d
oor through which   you entered the l
evel.  Until you find  the item this
door is coloured red and  has no mate
rial form.  ";
28075 PRINT"Whilst you are"'"carrying
 the item it will be green and  solid
 and you can pass through."'"You will
 then be told what the next itemthat
you require is and be transported  to
 the next level."'"You initially have
 five lives but can"
28080 PRINT"increase this number by e
ating the magicmushrooms that you wil
l find on your"'"travels, but beware
as they create"'"disturbance points,
also beware of the  bones of other pr
isoners."
28085 PROCget
28090 PRINT"If you lose a life whilst
 carrying an   object that object wil
l remain in the   room that you lost
your life in and 1000points will be d
educted from your score."''"Your cont
rols are as follows :-"''TAB(12)"Z...
.....LEFT"
28095 PRINTTAB(12)"X........RIGHT"'TA
B(12)":........UP"TAB(12)"/........DO
WN"'TAB(12)"SPACE....FIRE"
28100 PROCget:PROCtipaka
28105 ENDPROC
```

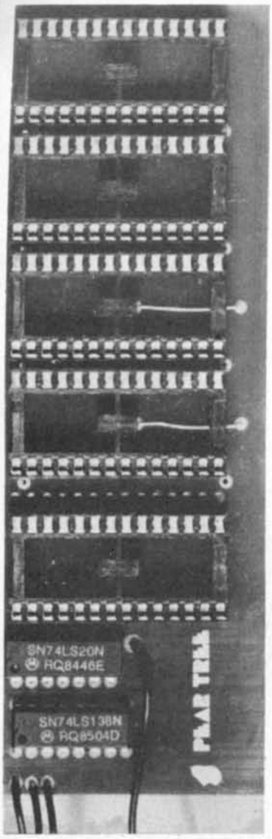
```
29000 DEFPROCtipaka
29005 CLS
29010 FORN%=0TO40
29015 FORM%=0TO1:PRINTTAB(0,23+M%)CHR
$141;
29020 FORT%=0TO3:PRINTCHR$(RND(7)+128
)" TIPAKA ";:NEXT:NEXT:PRINT':SOUND3,
-15,N%*3,1:NEXT
29025 PROCscrol
29030 ENDPROC
```

```
30000 DEFPROCget
30005 PRINT'''TAB(8)CHR$136CHR$130"PL
EASE PRESS SPACE"
30010 PROCspc
30015 PROCscrol
30020 ENDPROC
```

```
31000 DEFPROCscrol
31005 FORN%=0TO24:PRINT:SOUND1,-15,N%
*8,1:NEXT
31010 N%=TIME:REPEATUNTILTIME>N%+50
31015 ENDPROC
```

```
32000 DEFPROCshorten
32005 IFPAGE<=&1100 ELSECLS:PRINTTAB(
0,10)"PAGE IS SET TOO HIGH TO RUN 'TI
PAKA'"':VDU7,7,7,7:A%=0:Y%=0:IF(USR(&
FFDA)AND&F)=4 PRINT"I HAVE RESET PAGE
 TO &1100 AND AM"'"ATTEMPTING TO RELO
AD 'TIPAKA'":PAGE=&1100:CHAIN"TIPAKA"
:ELSEEND
32010 PROCcode
32015 PROCchar
32020 PROCinstruct
32025 IF HIMEM>&7C00 THEN ENDPROC
32030 T%=PAGE+1
32035 REPEAT
32040 T%=T%+LEN$T%+1
32045 UNTIL$(T%+3)="THEEND"
32050 ?T%=&FF
32055 *FX138,0,203
32060 *FX138,0,13
32065 *FX138,0,249
32070 *FX138,0,13
32075 END
```

This listing is included in this month's cassette tape offer. See order form on Page 183.



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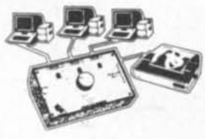

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From Page 108

```
 1000 REM Disc assembler-Pete Johnson
 1010 REM (c) The Micro User
 1020 MODE 7
 1030 ON ERROR REPORT:PRINT" at line
";ERL:CLOSE#0:END
 1040 PROCinit
 1050 ?srcChan=0
 1060 REPEAT
 1070 srcFile$=FNinput("Source filena
me :","SOURCE",0,4)
 1080 ms=srcFile$="MEM" OR srcFile$="
mem"
 1090 IF ms THEN srcAddr=EVALFNinput(
"Address of source :","",0,5) ELSE ms
=OPENUPsrcFile$:CLOSE#ms
 1100 UNTIL ms
 1110 ms=ms=TRUE
 1120 yn$=LEFT$(FNinput("Is the sourc
e BASIC ?","Y",0,6),1)
 1130 ?basic=yn$="y" OR yn$="Y"
 1140 objFile$=FNinput("Object filena
me :","OBJ",0,8)
 1150 mo=objFile$="MEM" OR objFile$="
mem"
 1160 $strBuff=objFile$
 1170 objAddr=EVALFNinput("Object fil
e address :","",0,10)
 1180 IF mo THEN PROCdoke(objChan,obj
Addr) ELSE ?objChan=OPENOUTobjFile$
 1190 ?status=&80 AND ms  OR  &40 AND
 mo
 1200 ON ERROR REPORT:x=POS:PRINT" at
 line ";ERL;TAB(x)" in file "file$:CL
OSE#0:END
 1210 FOR pass=4 TO 6 STEP 2
 1220 P%=objAddr
 1230 ?eof=FALSE
 1240 file$=srcFile$
 1250 PROCinitSrce(srcFile$)
 1260 REPEAT
 1270 O%=objBuffer
 1280 CALL readLine
 1290 IF ?chain AND ms THEN PROCerror
("Can't chain from memory"):STOP ELSE
 IF ?chain THEN PROCinitSrce($(srcLin
e+10)):GOTO 1330
 1300[opt pass:

 1310]
 1320 IF pass AND 2 THEN X%=O%-objBuf
fer : CALL writeLine
 1330 UNTIL ?eof
 1340 NEXT pass
 1350 CLOSE#0
 1360 IF mo THEN END
 1370 execAddr=EVALFNinput("Execution
 address of object :","&"+STR$~objAdd
r,0,VPOS+1)
 1380 !pb=strBuff
 1390 pb!2=objAddr
 1400 pb!6=execAddr
 1410 pb!14=0
 1420 X%=pb:Y%=pb/&100:A%=1:CALL osfi
le
 1430 END
 1440
 1450 DEF PROCinit
 1460 DIM objBuffer 255, strBuff 20,
pb &11
 1470 zpPtr=&70
 1480 srcChan=FNzp(2)
 1490 objChan=FNzp(2)
 1500 basic=FNzp(1)
 1510 count=FNzp(1)
 1520 eof=FNzp(1)
 1530 basicLine=FNzp(1)
 1540 chain=FNzp(1)
 1550 status=FNzp(1)
 1560 osfile=&FFDD
 1570 osbget=&FFD7
 1580 osbput=&FFD4
 1590 osbyte=&FFF4
 1600 cr=13
 1610 tab=9
 1620 del$=CHR$&7F
 1630
 1640 p%=PAGE+4
 1650 ass$="[opt pass:"
 1660 REPEAT
 1670 p%=p%+p%?-1
 1680 UNTIL LEFT$($p%,10)=ass$
 1690 srcLine=p%
 1700 PROCass
 1710 ?chain=0
 1720 ENDPROC
 1730
 1740 DEF PROCass
 1750 DIM code 220
 1760 FOR p=0 TO 2 STEP 2
 1770  P%=code
 1780 [ opt p
 1790 .getByte
 1800  bit status
 1810  bpl srcFile
 1820  ldy #0
 1830  lda (srcChan),Y
 1840  inc srcChan
 1850  bne ret
 1860  inc srcChan+1
 1870 .ret
 1880  rts
 1890
 1900 .srcFile
 1910  ldy srcChan
 1920  jmp osbget
 1930
 1940 .putByte
 1960  bit status
 1970  bvc objFile
 1980  ldy #0
 1990  sta (objChan),Y
 2000  inc objChan
 2010  bne ret
 2020  inc objChan+1
 2030  rts
 2040
 2050 .objFile
 2060  ldy objChan
 2070  jmp osbput
 2080
 2090 .readLine
 2100  lda #0
 2110  sta basicLine
 2120  sta chain
 2130  ldx #LENass$
 2140  bit basic
 2150  bpl skipSpaces
 2160  jsr getByte
 2170  jsr getByte
 2180  jsr getByte
 2190 .skipSpaces
 2200  jsr getByte
 2210  cmp #tab
 2220  beq skipSpaces
 2230  cmp #ASC" "
 2240  beq skipSpaces
 2250  cmp #ASC"~"
 2260  bne readLoop1
 2270  jsr getByte
 2280  cmp #ASC"~"
 2290  bne notEof
 2300  ror eof
 2310  bmi readLoop
 2320 .notEof
 2330  cmp #ASC""""
 2340  beq chainFile
 2350  dec basicLine
 2360  tay
 2370  lda #ASC"]"
 2380  sta srcLine,X
 2390  inx
 2400  lda #ASC":"
 2410  sta srcLine,X
 2420  tya
 2430  inx
 2440  bne readLoop1
 2450
 2460 .chainFile
 2470  ror chain
2480  bmi readLoop1
2490
2500 .readLoop
2510  jsr getByte
2520 .readLoop1
2530  cmp #cr
2540  beq endOfLine
2550  cmp #tab
2560  bne noTab
2570  lda #ASC" "
2580 .noTab
2590  ldy srcLine,X
2600  cpy #cr
2610  beq lineTooLong
2620  sta srcLine,X
2630  inx
2640  bne readLoop
2650
2660 .lineTooLong
2670  brk
2680  EQUB 46
2690  EQUS "Line too long"
2700  EQUB 0
2710
2720 .endOfLine
2730  bit basicLine
2740  bpl pad
2750  lda #ASC":"
2760  sta srcLine,X
2770  inx
2780  ldy #0
2790 .basicLoop
2800  lda srcLine,Y
2810  cmp #ASC":"
2820  beq pad
2830  sta srcLine,X
2840  inx
2850  iny
2860  bne basicLoop
2870
2880 .pad
2890  lda #ASC" "
2900 .padLoop
2910  ldy srcLine,X
2920  cpy #cr
2930  beq endOfLine2
2940  sta srcLine,X
2950  inx
2960  bne padLoop
2970
2980 .endOfLine2
2990  rts
3000
3010 .writeLine
3020  inx
3030  stx count
3040  ldx #0
3050 .writeLoop
3060  dec count
3070  beq endOfLine2
3080  lda objBuffer,X
3090  jsr putByte
3100  inx
3110  bne writeLoop
3120  rts
3130 ]
3140  NEXT p
3150 ENDPROC
3160
3170 DEF FNinput(prompt$,def$,x,y)
3180 PRINT TAB(x,y)STRING$(40-x," ")
;
3190 PRINT TAB(x,y)prompt$def$;
3200 Y%=GET
3210 IF Y%=&0D PRINT:=def$
3220 A%=138:X%=0
3230 CALL osbyte
3240 PRINT STRING$(LENdef$,del$);
3250 INPUT ""in$
3260 =in$
 3270
 3280 DEF PROCdoke(addr,val) !addr=!a
ddr AND &FFFF0000 OR val:ENDPROC
 3290
 3300 DEF PROCopenin(f$)
 3310 IF ?srcChan THEN CLOSE#?srcChan
 3320 ?srcChan=OPENUPf$
 3330 IF ?srcChan=0 THEN PROCerror("C
an't find "+f$):IF ?chain THEN CLOSE#
0:PRINT"(in file "oldF$")":END
 3340 ENDPROC
 3350
 3360 DEF PROCinitSrce(f$)
 3370 IF ms THEN PROCdoke(srcChan,src
Addr) ELSE oldF$=file$:file$=FNstrip(
f$):PROCopenin(file$)
 3380 IF ?basic THEN CALL getByte
 3390 ENDPROC
 3400
 3410 DEF PROCerror(err$)
 3420 VDU 7
 3430 PRINT TAB(19-LENerr$/2,23)err$
 3440 REPEAT UNTIL GET$=" "
 3450 PRINT TAB(0,23)STRING$(40," ");
 3460 ENDPROC
 3470
 3480 DEF FNzp(count) zpPtr=zpPtr+cou
nt: =zpPtr-count
 3490
 3500 DEF FNstrip(f$)IF RIGHT$(f$,1)=
" " THEN =FNstrip(LEFT$(f$,LENf$-1))
ELSE =f$
```

This listing is included in this month's cassette tape offer. See order form on Page 183.

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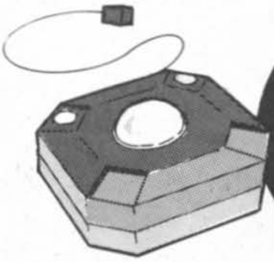

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Games look good on second processor

PEOPLE seem to have this strange idea that second processors are no good for playing games.

Well, it's not true, because although bought games will not work, home written games will. What is more, you are not confined to writing across the Tube to get special effects. A much better idea is to do the following:

*Assemble the program in the I/O processor, the BBC Micro's memory, with the second processor switch OFF, and add a bit of code to the front to change a vector such as the *CODE vector.*

*Save the code from the I/O processor, putting FFFFs at the start of all addresses in the *SAVE line, so that when the code is *RUN it will load and execute in the I/O processor and can be called from the second processor using *CODE, for example.*

It is now possible to poke the screen, because the code and screen are in the I/O processor, so the screen can be written to as if the second processor were switched off.

```
LDA #&41:STA &7E00
```

will work if you put the code in the I/O processor.

However take care choosing zero page locations to provide a vector for indirect addressing.

Most of &70 to &8F is used as workspace, so numbers put there will be overwritten. However I have found that as far as I can tell, &78 to &80 are safe.

I hope that this might make things clearer so that some games can be written for the second processor, because I am sure that some very good ones could be.

Just imagine a platform game with sprites, event-driven background music and 60k to put data and code into. A nice thought isn't it! – **Jeremy Bullock, Telford.**

!PLEH

HELP! If using either Disc Scanner from the November 1985 issue of The Micro User *or Dedit from August 1984, very often data is printed backwards. Do you know how to get it printed correctly?*

I do not mind if other data, normally OK, is printed backwards. – **Richard (Elite) Forster, Altrincham.**

● We're afraid you're stuck with your back to front data. This is because when strings are sent to fiies the transfer is always made in reverse order and that's how you see it.

Rewriting ROM

I HAVE read in The Micro User *Mike Harrison's short article in June 1985 and Peter Gaunt's in May 1985 about £ and #.*

I have a Canon PW1080 and would like to go the whole hog. I want to change code 35 to be # and code 96 to be £ and I will then have a printer which does not have to be software altered.

This will mean rewriting part of my ROM (it also has italics built-in) using an eprom programmer.

Is there anyone among your readers brave enough to tell me how to do this – including italics – please?

I appreciate that this will make my printer non-standard but I can always replace the original ROM if I decide to give away my printer. – **Mike Yorke, Camberley, Surrey.**

INSTR composition

HAVING newly discovered the handy INSTR command, I hastily set about a small program to test it out.

After a minute or two I completed and executed the following program and was surprised to hear the results.

Type it in and run it. Then tap in, at random, any of the keys 1 to 8 as fast as possible.

Do this for 20 or so seconds and then listen to the results.

If you are feeling particularly pleased with your composition, try programming each number on to one of the function keys for an automatic replay at the touch of a key. – **Mark Hanley, Leighton Buzzard.**

```
   10 MODE 7
   20 *FX 11,1
   30 *FX12,10
   40 A$="5=EIQYae"
   50 B$="12345678"
   60 *FX21,0
   70 G$=GET$
   80 X=INSTR(B$,G$)
   90 SOUND 1,-15,ASC(MID$(
A$,X,1)),1
  100 SOUND2,-15,ASC(MID$(A
$,X,1)),3
  110 SOUND3,-15,ASC(MID$(A
$,X,1)),5
  120 GOTO 70
```

Very interesting . . .

THE query raised by M.J. Holmes (Micromail, October 1985) regarding the calculation of compound interest seems to have been misunderstood by both yourselves and John H. Holt (Micromail, November).

Building societies and banks calculate simple interest on a daily basis in order that they may take account of withdrawals and deposits.

Such daily interest is accumulated and added to the principal at a regular interval, usually half-yearly, but sometimes quarterly, or annually, dependent on the bank or building society in question and the type of account held.

Interest on the account therefore, though calculated daily, is compounded quarterly, half-yearly, or annually. The dates on which interest is added can be most important.

In order to illustrate the points made in the previous paragraph, I shall refer to a Halifax Building Society paid-up share account with interest credited at half yearly intervals (January 31 and July 31).

If £100 was invested with the society on the second of January at an interest rate of eight per cent the account would be credited with 63 pence interest after close of business on January 31.

This is arrived at by using the formula, principal × daily interest rate × number of days interest earned (100 × 0.08/365 × 29).

So far so good, but now we come to the first problem. If the money was left in the account until August 1, a further £3.99 interest would be added – unless it happened to be a leap year when the interest would be £4.01.

Another complication arises if the account is closed, because any interest earned but not credited to the account would be lost.

For example, if £100.63 was withdrawn on July 31 (interest is not added until close of business) the account would be rendered closed and no interest would be added for the period February 1 through July 31, a loss of £3.99.

If, on the other hand, £100 was withdrawn and the 63 pence left to keep the account open £3.97 interest would be added after close of business.

In order to write a program which would accurately fulfil the needs of M.J. Holmes it would be necessary to know:

- ● *The date of his first investment.*
- ● *The dates of subsequent investments (taking into account*

→

From Page 159

bank holidays – neither investments nor withdrawals are possible when the banks are shut).

- *The dates interest would be added to the account.*
- *Whether he intends closing the account after 28 weeks.*

Without such knowledge the question posed by M.J. Holmes is capable of at least 28 disparate but equally correct answers, the difference between the lowest and highest being something like £2.50.

Financial institutions use computer programs to calculate interest, but it must be borne in mind that they are dealing with perhaps a million or more accounts, work with peripheral storage devices far advanced from the humble cassette player of many BBC Micro owners, and use compiled programs, written in a high-level language, for example Cobol, but run in machine code, to give greater speed.

Although it is feasible to write a comparable Basic program, one which would calculate compound interest for M.J. Holmes and take into consideration paying in dates, withdrawal dates, the dates on which interest is added, frequency of compounding, changes in the rate of interest, whether or not it is a leap year, and so on, to do so would be most uneconomical in both time and effort.

The calculations could be done manually on a pocket calculator or in command mode on a personal computer in a fraction of the time.

The formula to use: (initial principal × annual interest rate/365 × number of days preceding the second transaction) + (principal after second transaction × annual interest rate/365 × number of days preceding third transaction) + (principal after third transaction and so on) adding the accrued interest to the principal at the appropriate dates.

But bear in mind that interest is paid on credits from the day after paying in, and interest is not paid on debits for the day of withdrawal. – **Kenneth D. Knight, Rochdale.**

Good word for guide

MAY I please cast one vote in praise of the BBC User Guide. (Complaints have been cropping up recently.)

If it is bad, what were the manuals, when there were any, in the old days?

I am particularly impressed by the User Guide's attempt to serve many audiences, and its success in dividing up its contents. – **Tom Boyd, Petworth.**

Fanfare con brio

IN the December issue of The Micro User *Kevin Finn requested a fanfare envelope.*

Our first requirement is to define the question a little more clearly. A fanfare is a piece of music used for certain occasions which could be played on any instrument, the most usual being the trumpet.

As an envelope defines the volume shape of individual notes and not the character of a piece of music, a trumpet envelope is necessary.

Let us not fool ourselves into thinking that the standard BBC Micro can be made to sound like a trumpet, indeed its synthesising capabilities are extremely limited due to the availability of only one waveform (apart from noise) and a poor one at that.

The synthesis of conventional instruments is a complex process requiring sophisticated, dedicated equipment. With a Music 500 you would have a chance.

Having decided that the timbre or waveform is beyond us the envelope is quite possible and can vary according to the required effect.

A trumpeter has a great deal of control over each note, but in general there will be a fast attack, a fast decay to a fairly constant sustain and a fast release something like the following:

```
ENVELOPE 1,2,0,0,0,0,0,0,
127,20,0,-50,126,110
```

Alternatively a trumpet is capable of vibrato:

```
ENVELOPE 1,4,1,-1,1,1,1,1,1
27,20,0,-50,126,110
```

When writing your fanfare don't forget to use the correct pitch range of the tumpet.

To achieve a full-bodied sound use three part harmony or, if you prefer unison, use three channels together slightly detuned to give the impression of more than one player.

For an even more impressive sound why not employ the noise channel to make some percussion effects?

I hope this short explanation has been of some assistance and for a greater insight into the Micro's musical possibilities see "Mastering Music", published by the BBC, of which I am a co-author. – **Steven Gibbs, Chatham.**

Enabling shadow RAM

*WHEN writing a !BOOT file to initialise software such as Wordwise Plus on a B+ machine it is useful to include the command *SHADOW 0 to enable the shadow RAM facility, which is implemented by the first mode change occurring in the software itself.*

In Wordwise Plus, for instance, all documents are then previewed in Mode 0 whatever their length.

*Such a !BOOT file will not run on a model B because *SHADOW 0 is not recognised and produces the Bad Command error.*

To "trap" this error, a dummy machine code file can be created on the disc, with the name SHADOW.

*On the B+, *SHADOW 0 will be accepted by the operating system as intended. On other machines the operating system will pass the command to the*

Fast fading underscore

I HAVE typed in your Wordwise Utility from the November issue of The Micro User *and I have experienced some problems which I believe are not my fault.*

First of all, the printing of the listing itself is almost unreadable in places. Many of the underline characters used in the variable names have not printed or are hardly visible.

I refer you to the first column of page 172 where, in my copy of the magazine, in line 700, for example, the underline characters are not there at all and I have had to use my knowledge of Basic to interpret the syntax. And in addition, the PROCwindow parameter in line 780 is missing.

I wonder if there are any errors in the listing. For instance, lines 1900, 1910 and 1970 do not start with REMs and these would surely cause an error – I left them out. Your advice would be greatly appreciated. – **Richard Grant, Newcastle on Tyne.**

● The listing you refer to is correct but it is rather difficult to read. The underscore character which has been used in variable names is almost invisible in several lines – see 690, 700, 760, 800, 820, 910, 950. The invisible parameter in line 780, for PROCwindow, is in fact a 2.

The Basic Analyser listing in the same issue also suffered from unclear underscores. This time it was procedure names rather than variables which were upset.

If you are getting *No such variable* and *No such FN/PROC* in either of the programs ensure that the underscore character has been used rather than a *space*. Check the DEFPROC and PROC statements especially.

Lines 1900, 1910 and 1970 in the Wordwise utility program never get executed since they are between Function definitions. They should have been simple REM statements but the author typed the description of the following functions without any such REM statement. The three lines aren't necessary at all and can be removed (or REMed).

*DFS, which will *RUN the dummy program and return to the next command in the !BOOT file.*

The assembler program for the dummy file is:

```
10 P%=&70:[:RTS:]:END
```

RUN this to assemble the code. Then save the code to disc with:

```
*SAVE SHADOW 70 71
```

Location &70, in which the single byte dummy program is contained, should be available on any machine during the execution of a !BOOT file before Wordwise Plus or other software is executed. After having been called the software may over-write this location.

*Note that because the dummy program is called SHADOW and not SHADOW0, it is important to include the space in the command *SHADOW 0. This space is recognised in the DFS as a filename terminator.*

*The trap is thus equally effective with *SHADOW 1.* – **C.W. Robertson, Maidenhead.**

Plot 21 problems

I WAS intrigued by Colin Johnson's letter in December's Micromail describing a program using PLOT 21 to draw dotted lines, which unexpectedly yields an asymmetric display.

It seems particularly odd, since the effect is different in different modes.

In Mode 0 the program leaves a bald, kite-shaped patch to the left of the centre. In Modes 1 and 4 the patch is there, but it is much smaller.

In Modes 2 and 5 it is below the centre rather than to one side.

In fact the situation is even more complicated than this, as you can see if you run the program for about 10 minutes rather than the 70 seconds in Mr Johnson's original program.

The triangular area from the lower left-hand edge of the kite to the nearest corner of the screen also does not fill up fully, but is left full of horizontal stripes.

I believe I can offer an explanation of this phenomenon, though it is a little complicated to descrtibe.

It seems to be the cumulative result of a very small asymmetry in the way the BBC Micro draws lines, but which only shows up in the case of dotted lines – when using PLOT 21.

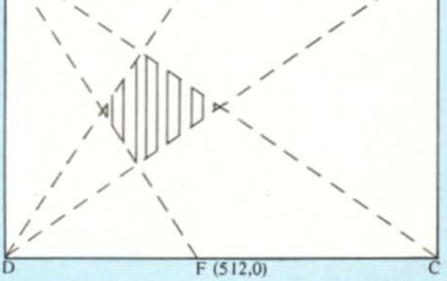
To draw a line between two points the computer alters pixels starting at one end and working towards the other. The thing is it always starts at the same end.

That it, it doesn't make any difference whether you enter:

```
MOVE 200,200:DRAW 600,600
```

or:

```
MOVE 600,600:DRAW 200,200
```



The computer will actually start drawing the line at 200,200. You cannot make it start at 600,600.

This has nothing to do with where the graphics cursor ends up. That will obviously be different in the two cases.

With normal, non-dotted lines this makes no difference, the end result is the same and the drawing of the line is too fast for you to see it happening anyway. However it does have a slight effect when drawing dotted lines.

The computer draws dotted lines by plotting alternate pixels of the non-dotted line. It plots the first, third, fifth, and so on until the last or last but one.

Now if the complete non-dotted line between the two points were made up of an odd number of pixels, then in drawing dotted lines it makes no difference which end the machine starts at – the pixels at the start and finish points will both be plotted and alternate ones in between.

However, if the complete line would be made up of an even number of pixels it does make a difference, because in this case the first pixel is plotted and the last but one is, but the last one itself is not.

So at which end of the line does the machine start, and exactly which pixels are plotted? In fact it depends on how steep the lines is.

Think for a moment about complete lines, and imagine a line which is made up of pixels touching at the corners.

Pixels have different sizes in different modes, so in Mode 0 such a line would run from 0, 0 to 512, 1024, in Mode 1 from 0, 0 to 1024, 1024 and in Mode 2 from 0, 0 to 1280, 640.

Alternatively, the line might slope in the opposite direction. Call this the critical gradient. Lines steeper than this line are plotted from the bottom of the screen to the top.

They have one pixel set in every horizontal row, and dotted lines have one pixel in every other horizontal row, starting at the bottom.

On the other hand lines which are less steep than the critical gradient are plotted starting at the left-hand end, independent of which way they slope.

Such lines have one pixel set in each vertical column of pixels or, if they are dotted, one pixel in every other column, starting at the leftmost end.

Now we can see what happens in Mr Johnson's case. Each of the four program lines 60 to 90 draws a line in a different area of the screen.

Line 60 will draw one in the triangle ACD (see diagram) with one end on the line AD and the other on the line DC. Line 70 draws a line on the triangle ABD, and so on.

Now consider what happens in the shaded, kite shaped area to the left of the centre when dotted lines are being used. This area is filled using lines between points on AD and AB and also lines between points on AD and DC. (Program lines 80 and 90 do not fill the triangle between AD and the centre.)

Any lines running through this kite will be less steep than the critical gradient (marked by lines AF and DE) so they will be drawn starting at the leftmost end (a pixel on the line AD) and with a pixel plotted in every other column.

If we call the left-hand column of pixels Column 0, the next one Column 1 and so on, then the pixels in the kite in odd numbered columns will never be plotted.

The result is that this area of the screen will eventually be filled with vertical alternate black and white lines.

In Mode 0 these lines are so close together that an ordinary TV cannot separate them, and you get a grey area.

The asymmetry arises because when the machine draws lines through the kite on the other side they run from a point on edge AB or edge DC to one on edge BC.

But such lines start being drawn at the end on the top or bottom of the screen, not the end on the right-hand edge BC. This means they can start with a pixel in any column, not just an even numbered one.

Consequently all pixels in the right-hand kite can be plotted, and as the program proceeds the area fills up.

If you try to work out what happens in other screen modes, then because the critical gradients are different the points E and F will not be in the same places, and so the final pattern will be different.

If you think a bit further, you can also see why in the bottom left-hand triangle only three-quarters of the pixels are eventually plotted, but I'll leave the details of that to you. – **D.L. Harper, Nottingham.**

Database needed

I AM soon to start a correspondence course and wish to store my notes using the BBC Micro with DFS. Please could you recommend a database software package?

Secondly, I use a Brother HR-5 printer. Please explain how I key in the correct command for the £ sign. – **T.B. Dale, Wokingham.**

● There are several types of database available for disc based systems. They range from low cost packages such as Mini Office, from Database Software, through Clare's Betabase, to Acornsoft's ROMbased Viewstore, reviewed in November's *The Micro User*.

A lot really depends on how much you want to pay – and you in fact get what you pay for.

To obtain the £ sign on the Brother you need to alter the DIP switches inside the machine – you can't do it from software.

Switches 1-7 and 1-8 should both be off to permit the £ sign. However, you will have now lost the hash (#) sign.

Multiple catalogues

I WAS very interested to see Geoff Turner's Disc Scanner program in the October issue of The Micro User.

I would like to use this with a Solidisk double density filing system but do not know how it will cope with the multiple catalogues which this filing system generates.

Can Geoff Turner or one of your readers help me to modify the program please? – **James S. George, Newark.**

● The catalogue routine has been designed to read in the catalogue from track 0, sector 0. By changing the two 0s at lines 260 and 280 to variables (track% and sector%) it will be possible to read catalogues from other disc locations.

And finally, with tongue firmly in cheek . . .

Logging-on to SLOBB

Dear Trev,

You may be wondering why it's been so long since you heard from me. Well, I haven't got in touch because I've joined the telecommunications revolution. Anyway I thought I'd drop you a line – a phrase which has now taken on a whole new meaning.

It all started when Ruben (late of the Romchester Rogues) decided that he'd had enough of micros. It seems he'd just invested in an 80 track drive when he read Mike Cook's article on downgrading your disc system from 80 to 40. According to Jocasta (wife and bellringer) a link snapped in his brain and he was never the same man (which used to be said of Jocasta, according to Andrea).

Anyway, whatever happened, all I know is that Ruben has entered St. Derek's Home for the Terminally Frustrated, a hospice run by monks from the order of St. Francis of Ascii. And, as a parting gift, he left me his Songthrush modem with the Muckstir communications software on ROM.

Do you know much about communications? The last time I'd done anything like it was when me and my pal Jeremy had messed around with cocoa tins and bits of string as lads. I'd forgotten about it until now, but apparently it had a major influence on Jeremy's outlook on life.

So picture the scene, me downstairs trying to fathom the Muckstir manual while Andrea knitted a new rope for starving African bellringers. Suddenly it dawned on me that I couldn't use the modem with my Beeb until I'd got a telephone line put into the spare bedroom.

"I need an extension", I blurted out without thinking.

"Yes dear", she replied nastily, using the same tone of voice she'd employed when she found me using her plum wine as paint stripper.

As it was, I had to wait for three weeks until the phone man came (their phone wasn't working and it seems my letter had been delayed in the post.)

As it was it only took the man, who insisted on being called Telephone Bill, 10 minutes to do the extension and an hour drinking coffee, finishing off the Christmas cake (which I'd been secretly feeding to Buster until the note from the RSPCA) and reminiscing about cocoa tins and bits of string. I put him in touch with Jeremy.

Once I'd got the line in I couldn't wait to get on line. According to the Muckstir manual the default settings were just right for bulletin boards, so I rang up SLOBB, the South Lancashire (and Oswaldtwistle) Bulletin Board. I should have known better than to use a number Clive had given me. The first message that came up was "Now then lad, what's thee name?" and whenever I picked a choice from the menu all I got was "Happen", all of which served to convince me that the South Lancashire board was run by a Yorkshireman.

Mind you the "news" menu was a dead give away:

1. St. Geoffrey – latest score.
2. Wensleydale cheese – special offer.
3. Emmerdale Farm star in micro scandal.

The messages themselves were fascinating. I never realised people could get so worked up about the relative merits of black pudding and tripe. But do they need a micro and modem to do it? After leaving a message for a French mistress in Accrington who was willing to give Basic lessons in her spare time, I logged off.

"Sithee" appeared on the screen, and that was that.

Stimulated by my entry into the wonderful world of information technology I decided to try out Prestel. Ruben had left me his identification number and password. And what can Prestel expect if they restrict passwords to four letters? At least it didn't appear on screen when I typed it in.

Isn't Prestel wonderful? It's just like the stuff you get on your TV when there's nothing interesting on. I flicked through page after page, trying desperately to get out, until I came across the Macronuts 666 section. It was great, full of misprints and software I could download. Most useful was a program that automatically translated from Yorkshire into English. Its author was given as SLOBB.

Eventually I found my way out (a man who cracked Perilous Pot without the aid of Alice can get out of anything) and decided to play around with all the parity settings.

It might have been better if I'd read the manual first, but all I got was garbage. In desperation I rang up the lads at Micro User.

"It's Wally", I heard as out of the corner of my eye I noticed the "Approved by Telephone Bill" sticker that had somehow appeared on the modem. "What can we do for you?"

I explained my predicament.

"Sorry, but we can't help. We've been banned from anything to do with communications since we misprinted British Telecom as British Telecon. They were so angry that they threatened to cut off our extensions".

"But it all goes wrong when I leave the default settings", I wailed.

"Well dat's de fault of de man dat does dat. Stick to cocoa tins and string".

I wonder if they know Jeremy? Anyway, I've had enough. I've given up learning about parity for a bit, I'm baud with it all.

Yours,

Bob

PS: News from St. Derek's. Ruben's gone religious and claimed to have had a vision of Bruce Brown's ascension into heaven. He says it came through at 300/300 baud.

Multiple catalogues can then be read either by adding a routine to select the required catalogue, or alternatively putting a loop in the program to read each catalogue in turn.

The track and sector values for each catalogue could then be read from DATA statements.

The program sets up a parameter block at &70 which is used by OSWORD to access the 8271 single density disc controller.

The data in the parameter block may need to be changed to suit the 1771 double density controller.

The information should be available in your DFS manual in the section dealing with the use of OSWORD.

Absolutely wizard

WIZARD'S Castle – what a program, one of your best, a mammoth typing exercise but worth every hour spent at the keyboard.

My son and I decided the only way to complete the game was to draw maps, which we have now done (he draws while I fight!) and we have all four levels completed.

The only problem with the listing was the comment that line 3140 must be typed as shown. What you failed to point out was that a space between the line number and REM marker was necessary.

The confusion was that when using AUTO line numbering – on listing the program ALL spaces after line numbers are removed – result, crash!

Can I suggest that a useful way of typing in listings is to carry out the following procedure before typing.

```
MODE 6
VDU 23,32,170,85,170,85,170
,85,170,85
```

What this does is to put a marker in your listing whenever the space character is encountered, so showing all spaces within the listing. Anyway a great game – more of this quality please. – **Chris Searle, Woodford Halse, Daventry.**

● We are delighted that you think so much of this program and it helps to prove that our judgement is correct.

We were impressed with it when it first came in, which is why we saved it for the Christmas issue.

Your comments about AUTO are not quite correct. The space that the command puts in your line as you type it is removed when you LIST the line.

But there's nothing to stop you putting another one in yourself that won't be removed.

Your suggestion for showing up spaces in listings will come in quite useful.

Error on line

I AM having problems with Wizard's Castle from the December issue of The Micro User. *Can you please answer a couple of questions?*

Why do warnings exist about Line 3140 when this is a REM?

Why do I keep receiving the message Error in line 3470?

As this is a simple .cget, I do not understand the problem. – **John D. Webber, Warrington.**

● Because Wizard's Castle is so long, the author included a routine that would delete the machine code data once this has been poked into memory.

This is achieved using line 3540, which searches for the word MARKER in memory, so that the deletion starts from the REM MARKER statement at line 3140.

For that reason the line must be exactly as shown in the magazine listing.

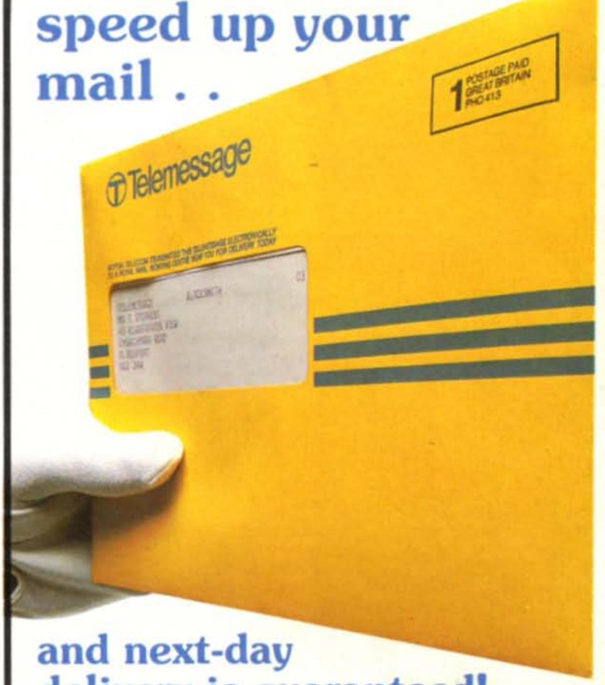
The answer to your second problem is simple, although the solution is not. There is a checksum routine in the program which totals all the machine code DATA and if the total of that typed in by you differs from the magazine, line 3200 tells you with an appropriate message.

Unfortunately line 3160, which helps to find the error line, has itself got a mistake in it. This should read:

```
3160 L%=3670:RESTORE 3670
```

Once this has been corrected it will assist in pointing to the line which contains your typing error.

The only possible way to find your error is to check carefully through the DATA statements contained in this line.



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Which is why there has been so much speculation throughout the industry about what the much-rumoured Mini Office II would be like. After all, how do you beat a best-seller?

The answer is – by making it even better! And the new Mini Office II is certainly that ... in every respect.

While still retaining upward compatibility with the original Mini Office, it is packed with a host of new features that have been made possible by the tremendous strides made in programming techniques in the last 12 months.

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And it comes with a no-nonsense easy-to-follow guide to business computing that will take you step by step through all the many features, showing you how to use their huge potential to the full.

Some of the features of the new Mini Office II

With the word processor you can ...
★ Select most features by menu or embedded commands. ★ Transfer records from database for personalised circulars. ★ Choose from three methods of display: 20 column (double size characters), 40 column, 80 column (20 and 80 columns only on 'B' Plus and 6502 Second Processor). ★ Centre, indent, tab, justify and merge text. ★ Insert, copy, move or delete blocks of text. ★ Select two editing modes: insert or overwrite. ★ Search and replace globally or selectively. ☆ Check typing speed in words per minute. ☆ See on-screen real-time clock, plus word and character count.

With the database you can ...
★ Select five field types (Alpha, Decimal, Date, Integer, Formula). ★ Perform all arithmetic functions. ★ Search over multiple fields. ★ Mark individual records. ★ Use flexible printout routine. ★ Pass records to the word processor. ☆ Carry out powerful multi-field record sorting.

With the spreadsheet you can ..
★ Total rows and columns, with easy selection of criteria. ★ Copy formulae either absolutely or relatively. ★ Print out all or part of the spreadsheet. ★ Move directly to a specific location. ★ Select movement of cursor. ☆ Recalculate automatically or manually.

With the label printer you can ...
★ Design any style of label with the versatile editor. ★ Select label size and sheet format. ★ Read directly from database files.

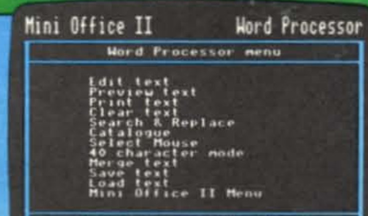
With the graphics pack you can ...
★ Enter data directly or take from spreadsheet. ★ Use icon type menus. ☆ Choose pie chart, bar chart or line graph. ★ Display up to three line graphs simultaneously. ★ Display up to three bar charts side by side or stacked. ★ Choose bar charts in either 2D or 3D. ★ Draw compacted or emphasised pie charts. ★ Define your own style of shading. ★ Dump graphs directly to Epson or Seikosha compatible printer.

With the comms pack you can ...
★ Access MicoLink or Telecom Gold with only two key presses. ★ Select protocols as required. ★ Change modes while on-line. ★ Store text directly to memory or disc. ★ Use one-key 'Stop' command.

With all the modules you can ...
★ Use the AMX Mouse. ★ Choose foreground and background colour in most modes. ★ Make more efficient use of memory and faster response time thanks to machine code content. ★ Take advantage of the extra memory of the BBC B Plus and 6502 Second Processor.

★ **Features that were not in the original Mini Office.**

It's a word processor ...

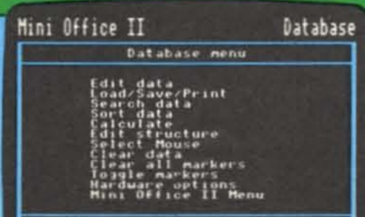


```
Mini Office II           Word Processor
          Word Processor menu

          Edit text
          Preview text
          Print text
          Clear text
          Search & Replace
          Catalogue
          Select Mouse
          40 character mode
          Merge text
          Save text
          Load text
          Mini Office II Menu

        Use cursor keys to choose
           then press RETURN
       (c) Database Software 1986
```

It's a database ...

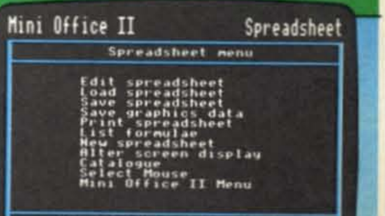


```
Mini Office II                 Database
             Database menu

          Edit data
          Load/Save/Print
          Search data
          Sort data
          Calculate
          Edit structure
          Select Mouse
          Clear data
          Clear all markers
          Toggle markers
          Hardware options
          Mini Office II Menu

        Use cursor keys to choose
           then press RETURN
       (c) Database Software 1986
```

It's a spreadsheet ...



```
Mini Office II              Spreadsheet
           Spreadsheet menu

          Edit spreadsheet
          Load spreadsheet
          Save spreadsheet
          Save graphics data
          Print spreadsheet
          List formulae
          New spreadsheet
          Alter screen display
          Catalogue
          Select Mouse
          Mini Office II Menu

        Use cursor keys to choose
           then press RETURN
       (c) Database Software 1986
```

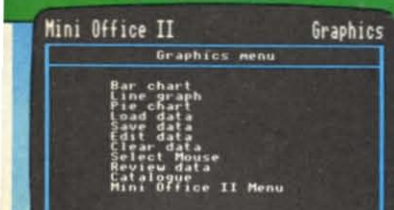
It's MINI OFFICE II on the BBC Micro! All 6 modules

Software

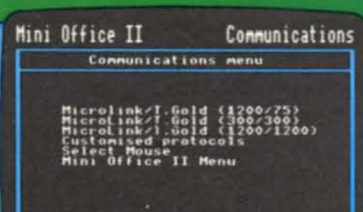
ORDER FORM ON PAGE 183

Mini Office II
Main menu
Word Processor
Database
Spreadsheet
Graphics
Communications
Label Printer
Exit Mini Office II
Use cursor keys to choose then press RETURN
(c) Database Software 1986

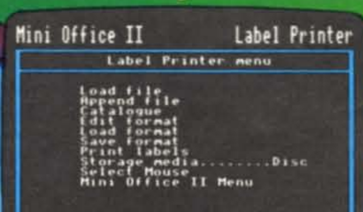
It's a graphics pack . . .


Mini Office II
Graphics
Graphics menu
Bar chart
Line graph
Pie chart
Load data
Save data
Edit data
Clear data
Select Mouse
Review data
Catalogue
Mini Office II Menu
Use cursor keys to choose then press RETURN
(c) Database Software 1986

It's a comms pack . . .


Mini Office II
Communications
Communications menu
Microlink/T.Gold (1200/75)
Microlink/T.Gold (300/300)
Microlink/T.Gold (1200/1200)
Customised protocols
Select Mouse
Mini Office II Menu
Use cursor keys to choose then press RETURN
(c) Database Software 1986

It's a label printer . . .


Mini Office II
Label Printer
Label Printer menu
Load file
Append file
Catalogue
Edit format
Load format
Save format
Print labels
Storage media........Disc
Select Mouse
Mini Office II Menu
Use cursor keys to choose then press RETURN
(c) Database Software 1986

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System Delta Advanced Reference Guide **19.95**
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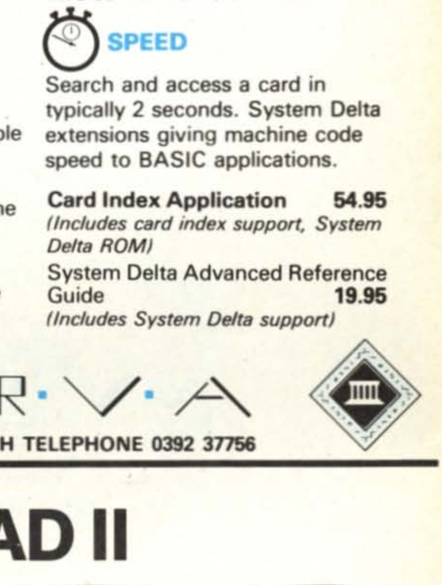
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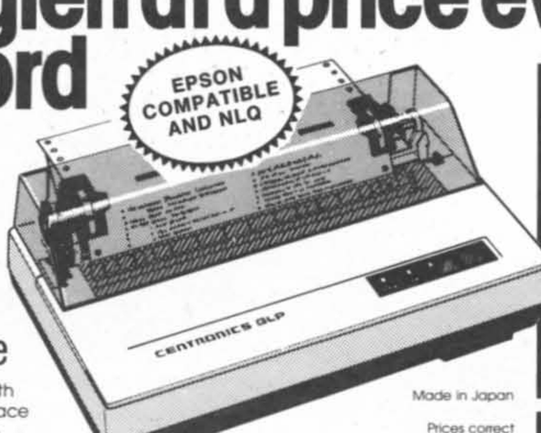

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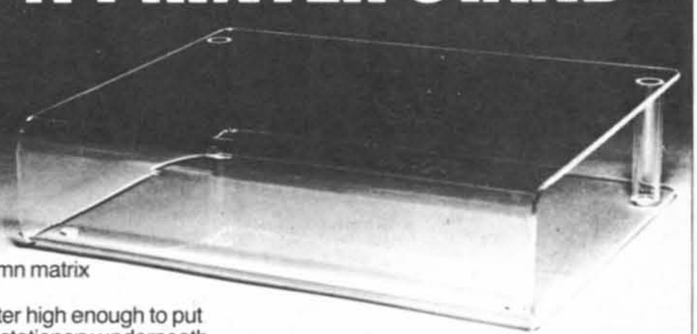

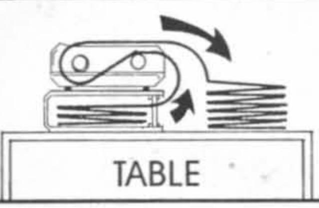

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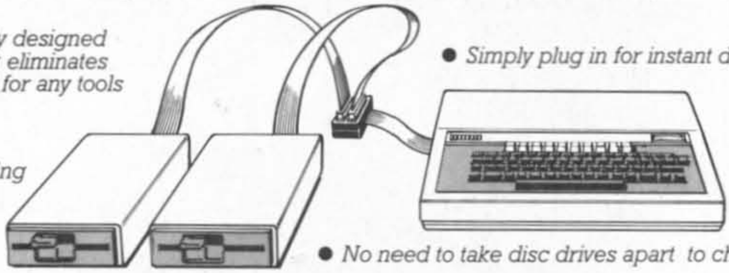

- *No need to take disc drives apart to change links*

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There are two systems – the 'Standard' and the 'Low Profile'. Viglen is the leading producer of both.

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● All cartridges are gold-plated for durability and reliability, unlike others which are only silver plated. ● No need to switch machine off between cartridge changes. ● Insert and remove 'Wordwise' 'View' 'Disc Doctor', etc., at will, from your micro in absolute safety. ● Low, low power consumption unlike other systems. ● Save on memory.

PRICE FOR COMPLETE KIT, including 1 cartridge, 1 Cable Assembly, 1 Blanking Off Plate (used if system is removed), 1 Socket Cover (used when no cartridges are resident), 1 Cartridge Storage Rack. **£15.95**

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Over 40,000 sold

The Standard System used extensively in education is preferred, due to its robust construction and ease of use.

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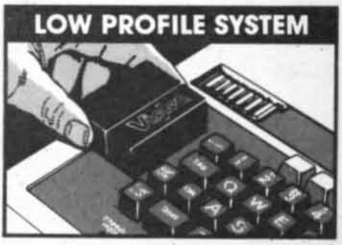

With the sideways entry on the low profile system access to the escape and tab keys are slightly restricted. However Viglen betters its rivals in this respect by being 3mm lower.

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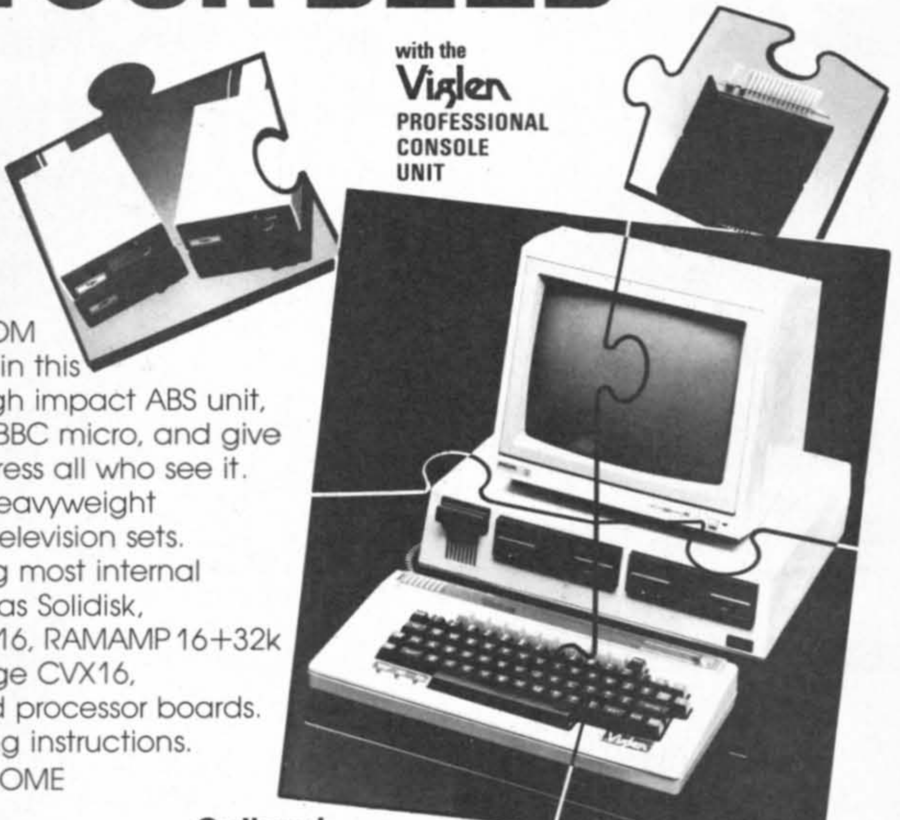

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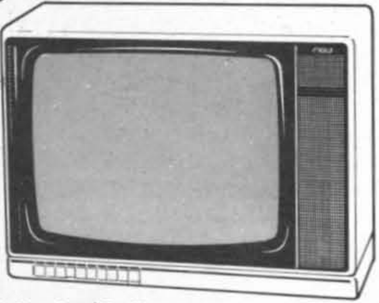

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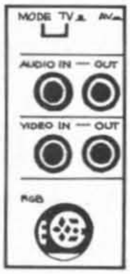

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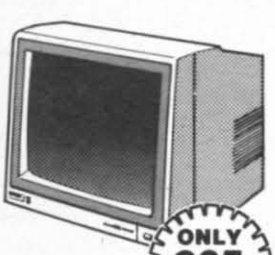

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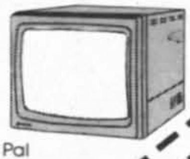

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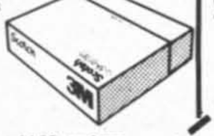

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Now includes 80 column mode when using the 2nd processor.

The DEBUGGER is instantly accessible for inspecting, modifying and disassembling machine code programs. Features include full 64 byte display in hex, ASCII and disassembled format; registers; stack; single step; breakpoints; memory search and much more.

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SPY2 includes a set of powerful disc recovery commands for interrogating, editing and retrieving data stored on a floppy disc. SPY2 also includes a disc formatter as well as a non-destructive single track reformatter.

In all SPY2 has a comprehensive set of 23 utility commands. These are supported by an excellent Reference Manual.

The SPY2 front panel encompasses all the superb, easy-to-use facilities of the renowned SPY debugging monitor PLUS additional commands for toggling and finding breakpoints; relocating machine code programs; single stepping through subroutines in one go and facilities for accessing the front panel from programs in RAM or ROM with breakpoints, OSBYTE or CTR-F.

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SPY2 features a disc sector editor displaying the contents of a whole sector; disc search facilities for finding byte patterns or strings and free disc space. Files may be recovered by creating a directory entry with all the data concerning the deleted file. Directory entries can be easily amended using the *AMEND command. The *FORMAT command formats discs with any number of tracks. A verify command checks discs. The *REFORMAT command is extremely useful for recovering information from a bad track, reformatting it and restoring the data.

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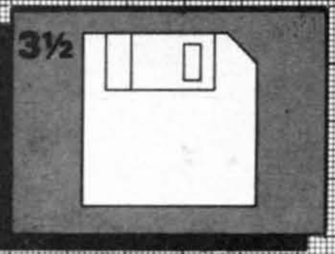

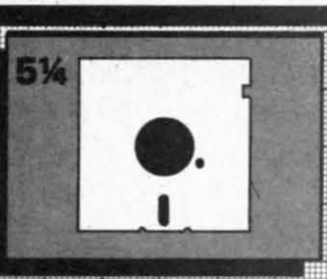

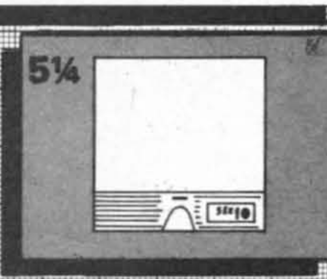

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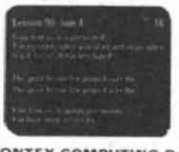

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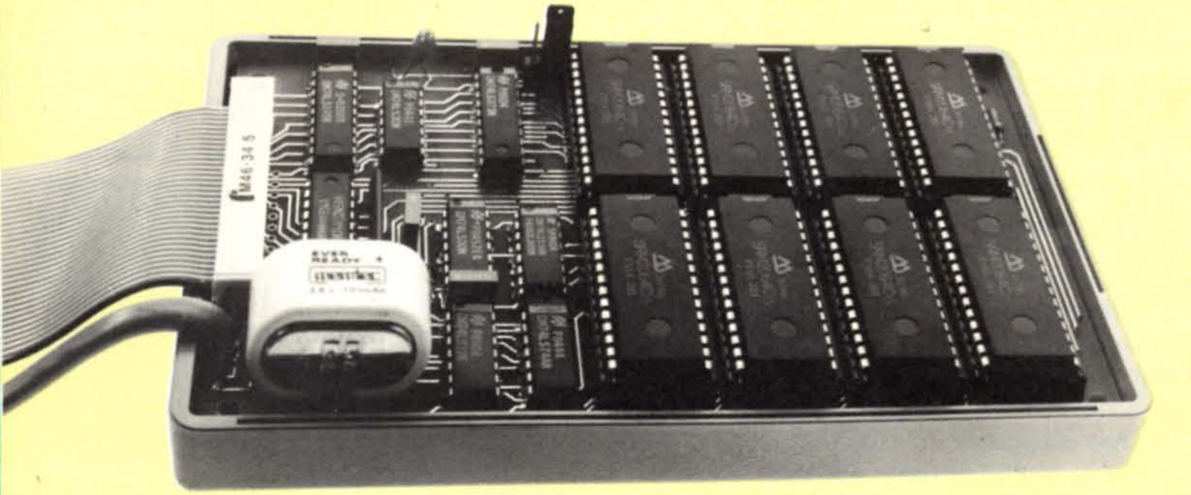

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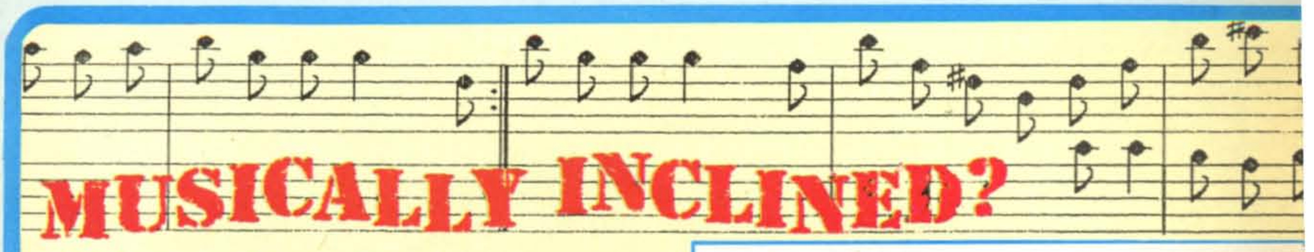

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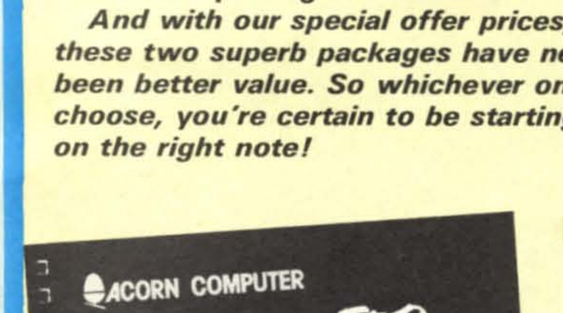

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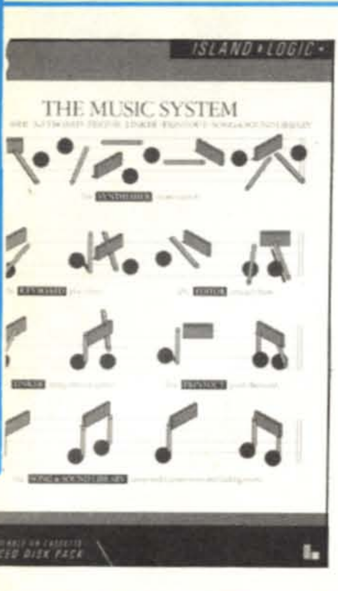

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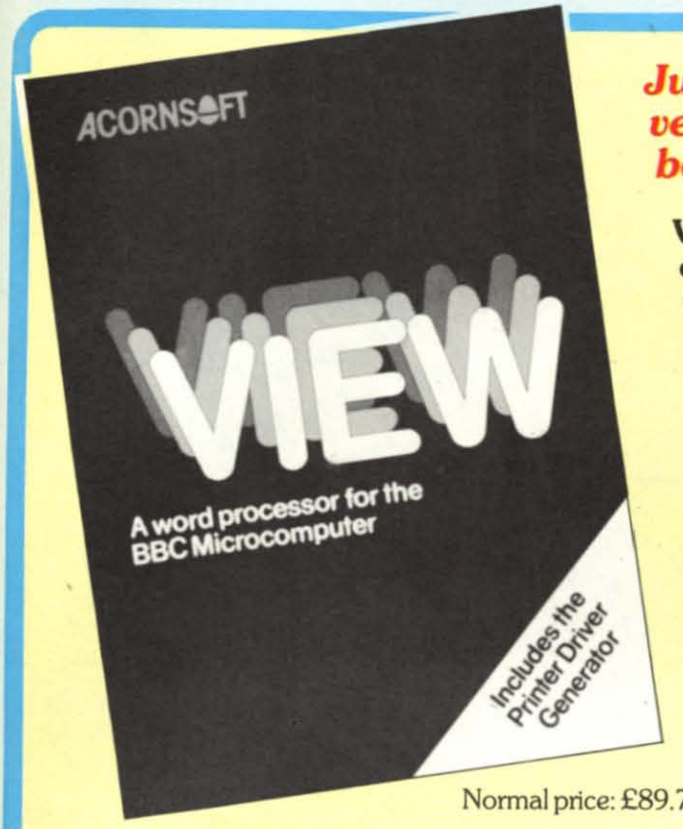
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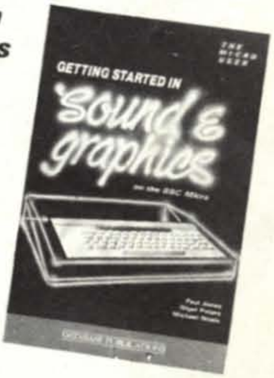

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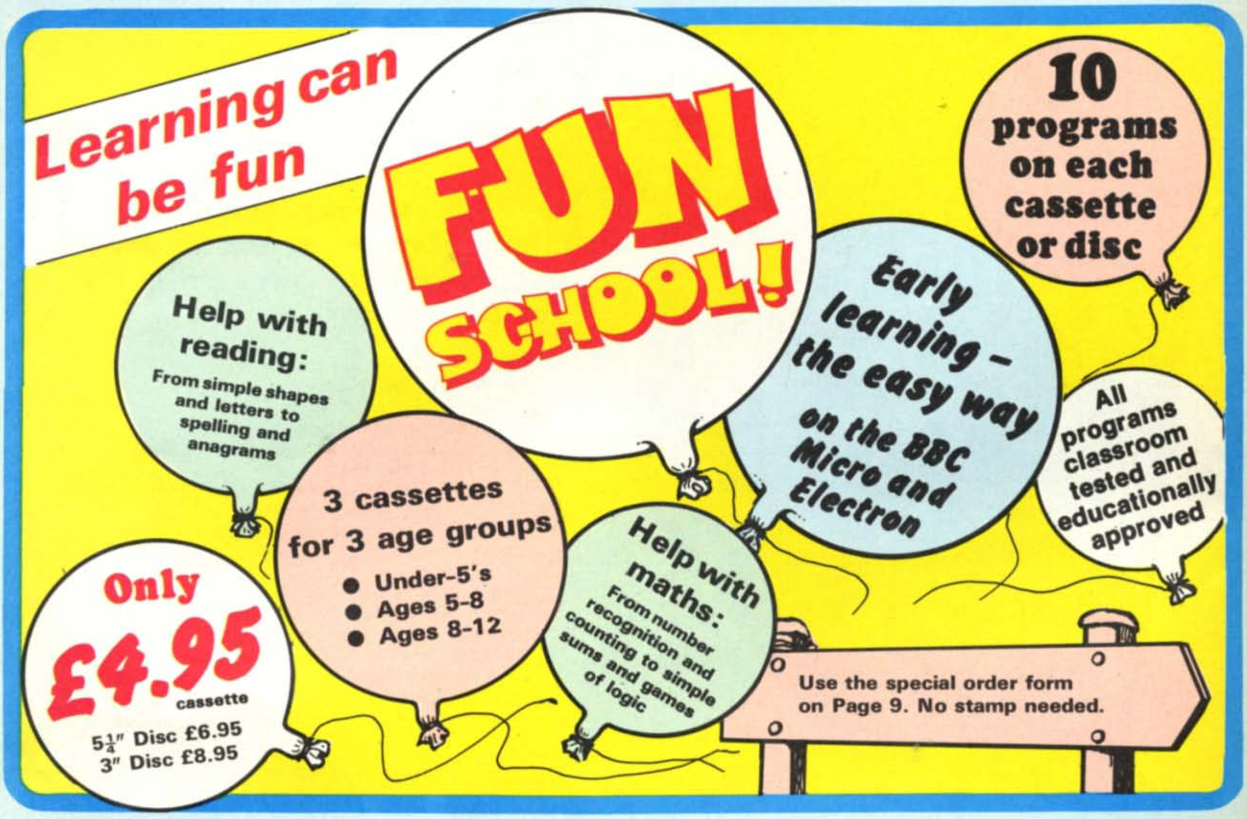

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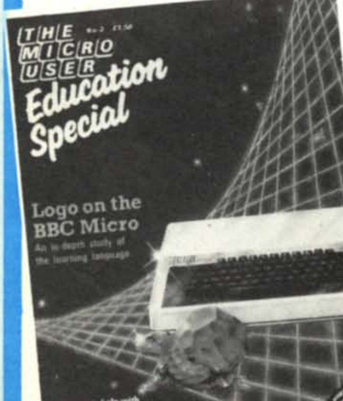

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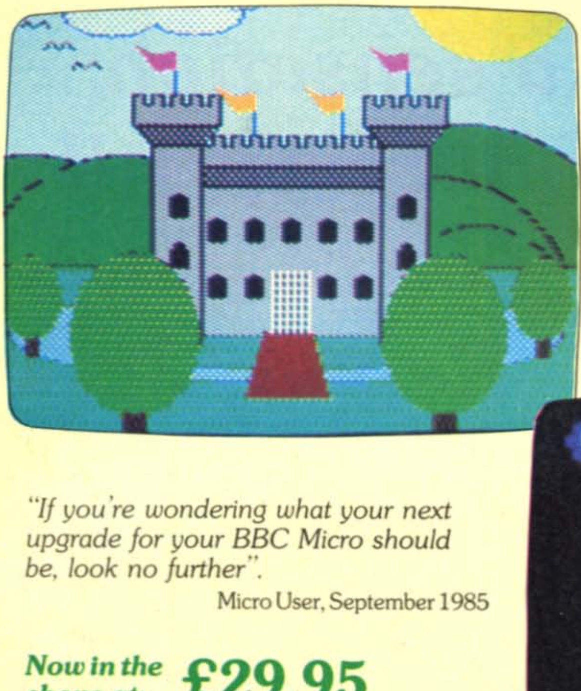

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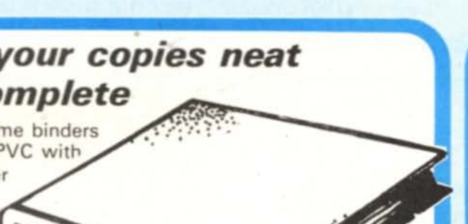

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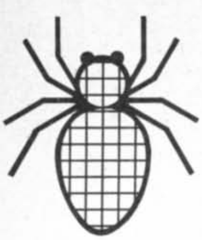

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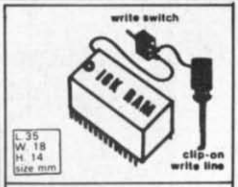

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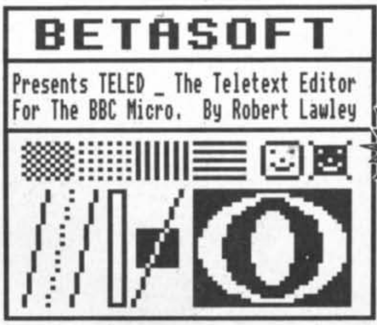

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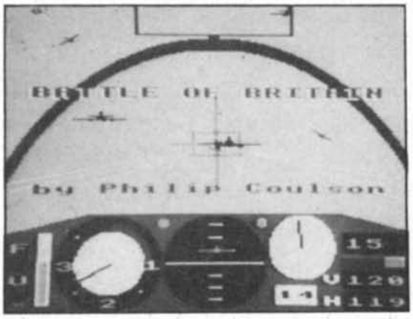

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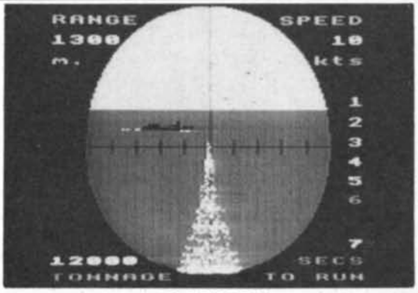

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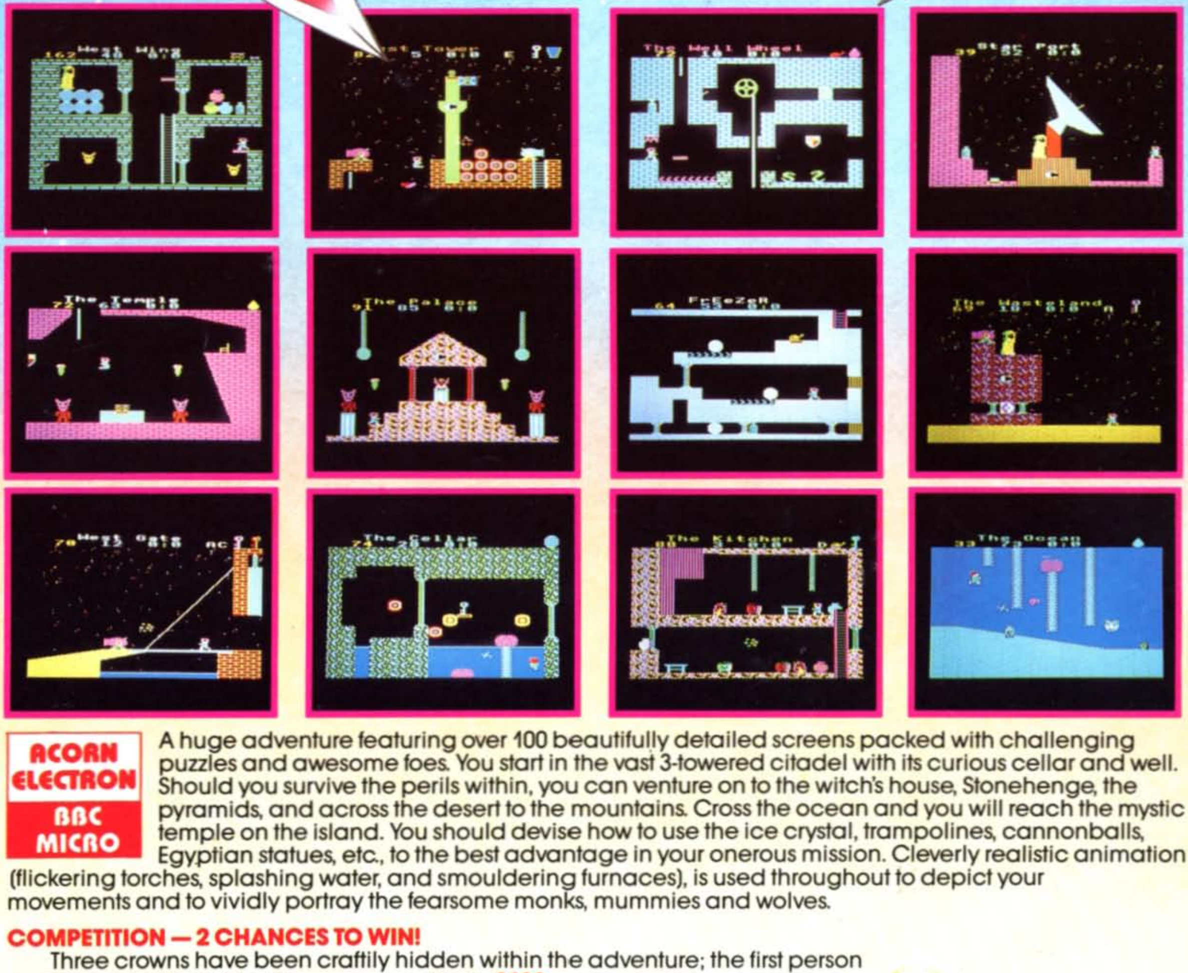

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